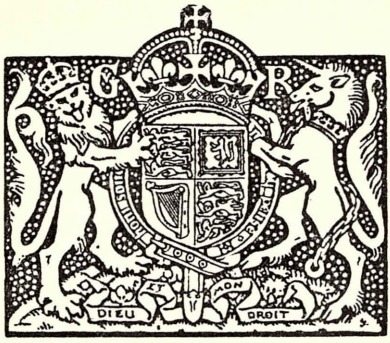

AIR MINISTRY—DIRECTORATE OF CIVIL AVIATION

Report on the Progress of Civil Aviation

1928

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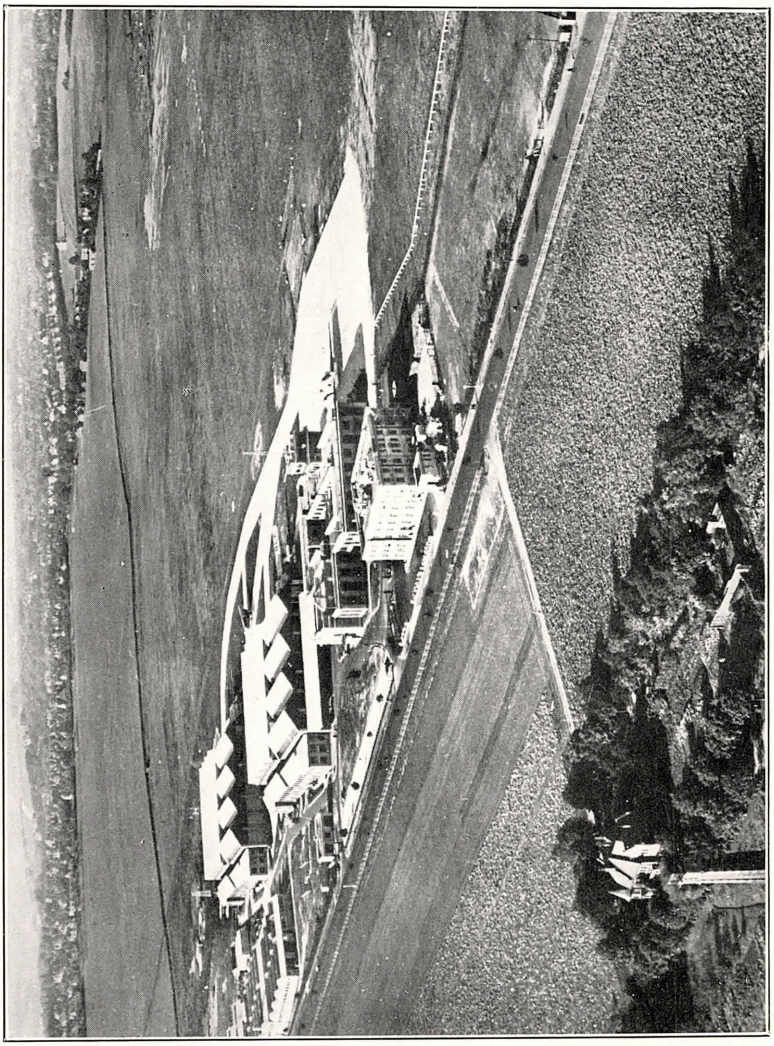
PREFATORY NOTE.

The publication of this Report has been delayed this year by special circumstances, and in consequence, brief reference has been made in certain sections of the Report to developments which have occurred since the close of the year actually under review.

Frontispiece.



Croydon Aerodrome from the Air.

CONTENTS.

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LIST OF ILLUSTRATIONS AND MAPS.

CHAPTER I.

CIVIL FLYING.

IMPERIAL AIRWAYS LTD.—EUROPEAN SERVICES.

During 1928, Imperial Airways, Ltd., continued with increasing success their operation of the three routes, London–Paris–Zurich, London–Brussels–Cologne and Southampton–Guernsey.

The frequency of these services was as follows :—

	Summer. (May to September).	*Winter.* (October to April).
London–Paris	Thrice Daily ...	Twice Daily.
London–Paris–Basle–Zurich ...	Daily	Twice Weekly.
London–Ostend...	Daily	—
London–Brussels–Cologne ...	Daily	Daily.
Southampton–Channel Isles ...	Weekly... ...	Weekly.

A total mileage of 793,365, representing a total horse-power mileage of 784,142,380, was completed on these services during the year, while, in addition, about 80,000 miles were flown by the company on flights distinct from their regular air services.

IMPERIAL AIRWAYS LTD.—ENGLAND-INDIA AIR SERVICE.

A new Agreement, which came into force on 1st April, 1929, was made with Imperial Airways, Ltd., in substitution of all existing agreements with that company. The services to be provided under this Agreement cover not only the daily services on certain European routes, mentioned above, but also a weekly service in each direction between England and India.

The company continued the operation of the Cairo–Basrah section of the latter route once a week in each direction throughout the year. Fifty-two flights from Cairo to Basrah and 53 in the reverse direction were completed, and 99 per cent. efficiency was attained in the commencement and completion of scheduled flights, while the average amount of mails carried per flight during the year was 484 lbs. as compared with an average of 340 lbs. in 1927.

For reasons explained in the last report it was not possible to open the section between Basrah and Karachi during 1928. Negotiations with the various governments over whose territory

it would be necessary to fly continued, however, throughout the year, and the complete service from London to Karachi was opened on 30th March, 1929.

The services operated by Imperial Airways, Ltd., are shown on the map facing this page, and complete statistics of the company's operations are given in Chapter V.

IMPERIAL AIRWAYS LTD.—PROPOSED EGYPT-SOUTH AFRICA SERVICE.

Since the close of the year under review Imperial Airways, Ltd., have concluded an agreement with Cobham Blackburn Airlines, Ltd., for the formation of a company to be known as Imperial Airways Africa, Ltd., which will be responsible for the operation of the proposed air service from Egypt to South Africa. Further details of this service are given in Chapter VI under " East Africa."

MISCELLANEOUS COMMERCIAL FLYING.

Messrs. Imperial Airways continued to develop their special charter service, and many interesting flights in this category, including sight-seeing European tours and a flight over Budapest for the purpose of dropping propaganda leaflets in connection with the Peace Pact, were carried out during the year. On the occasion of the annual Oxford and Cambridge boat race air liners were used with great success as grand-stands, and special services were organised to many of the well-known race meetings.

Other firms employed in air-taxi work were Surrey Flying Services, Ltd., A.D.C. Aircraft, Ltd., and Air Taxis, Ltd. The latter company's machines, during the year ended 1st August, 1929, covered a total distance of over 64,000 miles during the course of special charter flying. This mileage embraces trips covering practically all parts of the British Isles and the Continent, and includes a trip to Africa, all flights having been successfully carried out without a single forced landing.

As mentioned under " Light Aeroplane Clubs and Private Flying," a new company entitled National Flying Services, Ltd., has now entered the field and should play a considerable part in the future development of miscellaneous commercial flying in England.

AIR SURVEY AND PHOTOGRAPHY.

Progress has continued unchecked in the establishment of air survey as an economic method of carrying out investigations of many kinds, including geological investigations and those in

connection with irrigation, settlement, railway engineering, and other projects—the type of survey ranging from general reconnaissance to large-scale precise surveys.

The Air Survey Committee has continued to perform its function of advising and helping commercial undertakings in this work, and at the same time proceeding with the investigation of new methods.

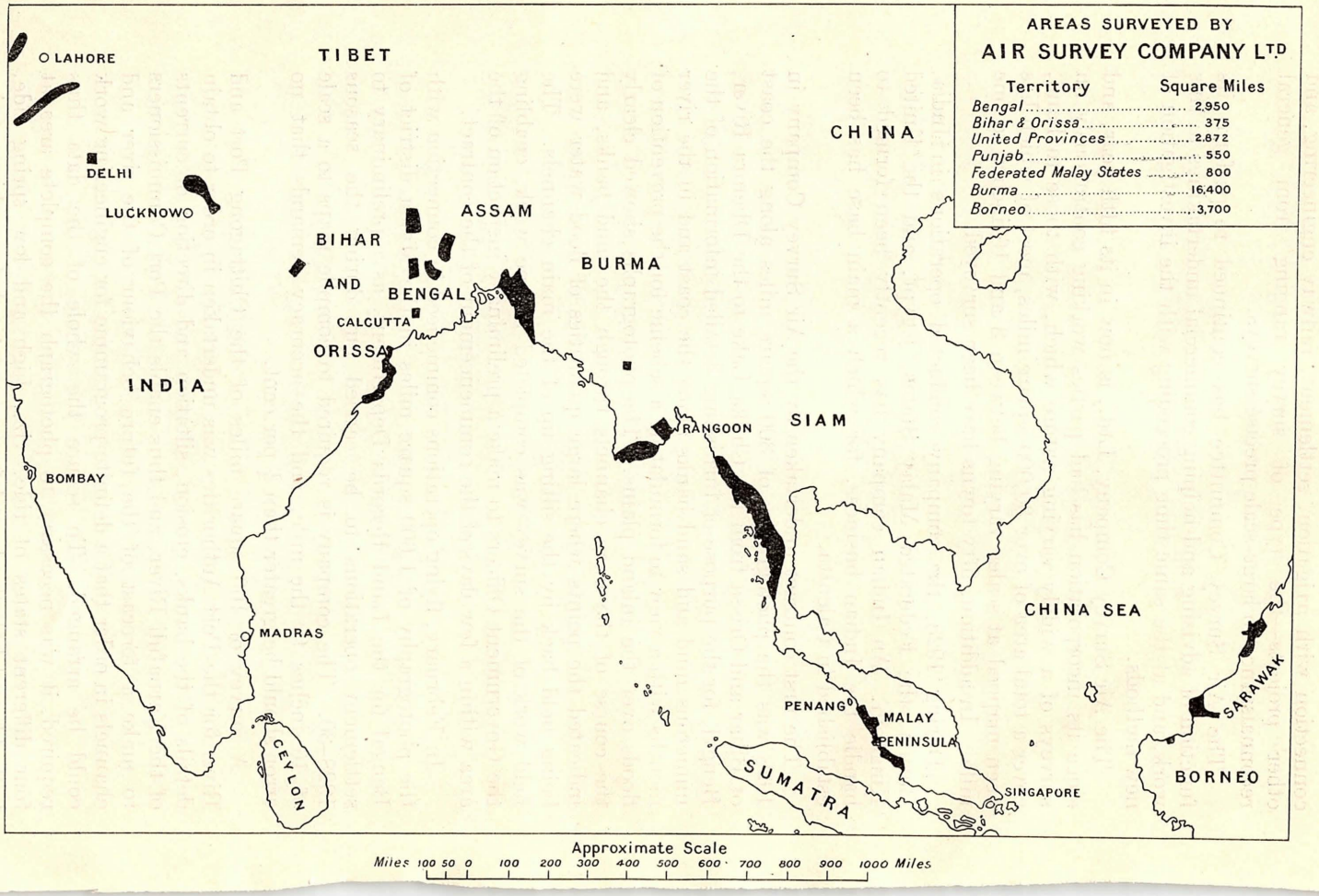
The Air Survey Company, Ltd., is now in its fifth year, and since its incorporation has had parties working continuously on surveys of a widely varying nature which, with those in hand, cover a total area of over 30,000 square miles, most of which has been mapped at scales varying between 3 and 16 inches to one mile. In addition, fifty towns have been surveyed.

During 1928, the company conducted operations in India, Burma, the Federated Malay States, Egypt, and the United Kingdom. An Indian company has recently been formed to handle the Indian business, for which a main base has been established in Calcutta.

The first contract undertaken by the Air Survey Company in 1928 was the photography of 300 square miles along the coast of Bihar and Orissa from the Chilka Lake to the Dhemra River, Bengal, for the purpose of furnishing detailed information of the numerous mud and sand banks along the coast and in the river mouths with a view to formulating a scheme for the prevention of floods over the inland plains. The photographs showed clearly the course of the deep channels through the mud banks, and indicated the points where large quantities of flood water were being held back by the silting up of the main channels. The field work of the survey was completed in one week, enabling the Government Officers to make a preliminary inspection of the area within a few days of the commencement of the contract.

In February, flying operations commenced in connection with the photography of 1,600 square miles in the Malda district of Bengal for the Land Records Department, as a preliminary to settlement operations to be carried out during the seasons 1928–30. The company is required to compile maps to a scale of 16 inches to the mile, and the accuracy demands that no error should be greater than $\frac{1}{2}$ per cent.

A survey of 100 square miles of the Chittagong Port and River for the Port Authorities was undertaken in order to obtain details of the banks, erosion, siltation and direction of currents of the Karnafuli River, and thus enable the Port Commissioners to make a forecast of the future behaviour of the river and channels in order that a definite programme for engineering work could be arranged. To secure the whole of the data thus required, it was necessary to photograph the complete area at four different states of tide, viz., high and low spring tide, half ebb and half flood, and four complete photographic mosaics on a scale of 12 inches to the mile were prepared.


AREAS SURVEYED BY
AIR SURVEY COMPANY LTD
Territory Square Miles
Bengal 2,950
Bihar & Orissa 375
United Provinces 2,872
Punjab 550
Federated Malay States 800
Burma 16,400
Borneo 3,700
LAHORE
TIBET
CHINA
DELHI
LUCKNOWO
ASSAM
BIHAR
AND
BENGAL
BURMA
CALCUTTA
ORISSA
INDIA
RANGOON
SIAM
BOMBAY
CHINA SEA
MADRAS
PENANG
MALAY
PENINSULA
SARAWAK
SUMATRA
SINGAPORE
BORNEO
CEYLON
Approximate Scale
Miles 100 50 0 100 200 300 400 500 600 700 800 900 1000 Miles

Town planning work, including parts of Calcutta, and the whole of Georgetown, Penang, was mapped on a scale of 20 inches to the mile.

Flying operations in connection with the photography of 2,440 square miles in the United Provinces were commenced in October. This contract was for the survey and the production of maps on a scale of 16 inches to 1 mile, of certain areas in the Sitapur, Bahraich and Fyzabad districts. Each village in the area has to be mapped on separate sheets which will clearly show all plot boundaries, village boundaries and other details, and also, by conventional signs, all tanks, roads, paths, rivers, railways, woods, wells and homesteads.

Extensive surveys were undertaken on the Chenab and Sutlej Rivers for the Irrigation Department of the Punjab Government, while somewhat similar surveys of the Bengal rivers and more than thirty smaller surveys for engineering purposes were also completed. In addition, the Port limits on the Hoogli River, which extend a considerable distance north of Calcutta, were surveyed and mapped on a scale of 24 inches to 1 mile, while for the first time in India, air survey was also employed in the alignment of an important new railway line.

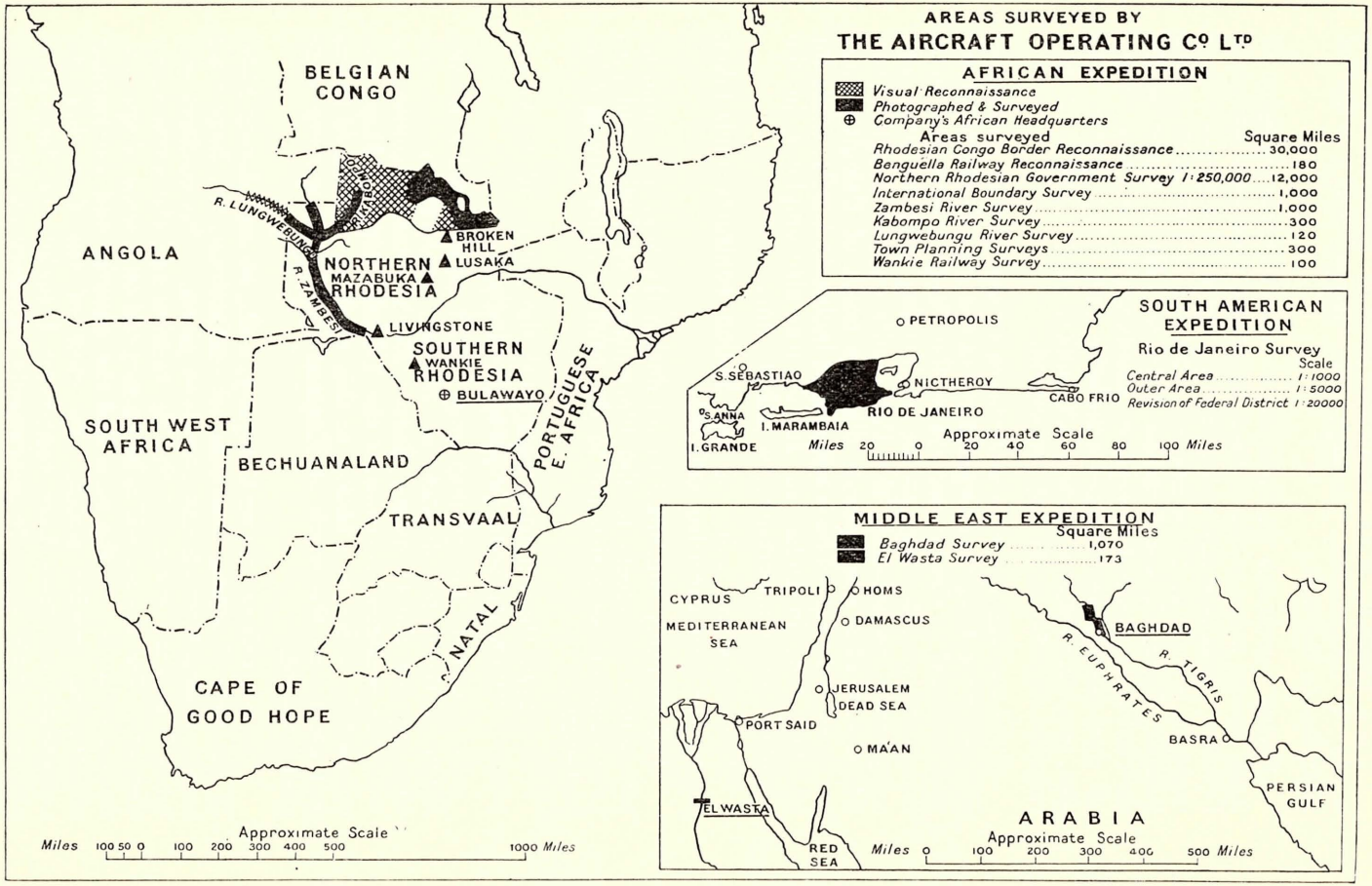
The aggregate value of the Indian contracts undertaken during the year exceeded £60,000.

The company continued to act during the year as consulting aeronautical engineers to the Government of India, and also gave considerable assistance to the newly formed Flying Club in Bengal.

In Egypt the company completed the survey of 47 towns, plans of which are being prepared in England.

In England, the photography of 58 square miles in the Brighton–Worthing district of Sussex, undertaken by the company for the Ordnance Survey Department in connection with the periodical revision of the 1/2500 Ordnance Map, was completed, while, in addition to this work, a number of towns and estates in the south of England and in Lancashire were photographed.

The Aircraft Operating Company, Ltd., secured during 1928, in the face of strong international competition, the largest air survey contract which has ever been given. This contract was for a large-scale survey of Rio de Janeiro and the surrounding districts. The town itself is being mapped on a scale of approximately 63 inches to the mile and the suburbs and surrounding country on smaller scales. In view of the fact that the continental countries have concentrated mainly on large-scale surveys and the accurate instruments necessary for the plotting of such large-scale work, whereas air survey work in the British Empire has in most instances been confined to small-scale


AREAS SURVEYED BY
THE AIRCRAFT OPERATING Co LTD
AFRICAN EXPEDITION
Visual Reconnaissance
Photographed & Surveyed
Company's African Headquarters
Areas surveyed — Square Miles
Rhodesian Congo Border Reconnaissance 30,000
Benguella Railway Reconnaissance 180
Northern Rhodesian Government Survey 1:250,000 12,000
International Boundary Survey 1,000
Zambesi River Survey 1,000
Kabompo River Survey 300
Lungwebungu River Survey 120
Town Planning Surveys 300
Wankie Railway Survey 100
BELGIAN CONGO
ANGOLA
R. LUNGWEBUNGU
R. ZAMBESI
KABOMPO
BROKEN HILL
LUSAKA
NORTHERN RHODESIA
MAZABUKA
LIVINGSTONE
SOUTHERN RHODESIA
WANKIE
BULAWAYO
SOUTH WEST AFRICA
BECHUANALAND
TRANSVAAL
NATAL
CAPE OF GOOD HOPE
PORTUGUESE E. AFRICA
Approximate Scale
Miles 100 50 0 100 200 300 400 500 1000 Miles
SOUTH AMERICAN EXPEDITION
Rio de Janeiro Survey
Scale
Central Area 1:1000
Outer Area 1:5000
Revision of Federal District 1:20000
PETROPOLIS
S. SEBASTIAO
NICTHEROY
CABO FRIO
S. ANNA
I. MARAMBAIA
RIO DE JANEIRO
I. GRANDE
Approximate Scale
Miles 20 0 20 40 60 80 100 Miles
MIDDLE EAST EXPEDITION
Square Miles
Baghdad Survey 1,070
El Wasta Survey 173
CYPRUS
TRIPOLI
HOMS
DAMASCUS
MEDITERRANEAN SEA
JERUSALEM
DEAD SEA
PORT SAID
MA'AN
EL WASTA
RED SEA
BAGHDAD
R. EUPHRATES
R. TIGRIS
BASRA
PERSIAN GULF
ARABIA
Approximate Scale
Miles 0 100 200 300 400 500 Miles

development surveys it is particularly creditable that such an important large-scale survey should have been awarded in a foreign country to a British company. The survey parties engaged on this work started operations in June, 1928, and the contract is expected to take three years to complete.

In other parts of the world the Aircraft Operating Company's expeditions were mainly engaged in completing work started in 1927 and in consolidating their position.

The African expedition, which started work by surveying the Rhodesian Congo Border Concessions, entered into occupation of their permanent base of Bulawayo and was engaged during the year in preparing quarter inch maps of 12,000 square miles of Northern Rhodesia for the local Government. The maps have been prepared, by the courtesy of the Rhodesian Congo Border Concessions, Ltd., from the photographs which were taken for their geological survey. Other work of this expedition consisted of the completion of township surveys of Broken Hill, Mazabuka, Lusaka and Livingstone on a scale of 6 inches to the mile, these surveys covering a total area of approximately 300 square miles. The photography of the Zambesi River and its tributaries, which was started at the end of 1927, was also completed and a further length of boundary was photographed for the Belgian Congo–Northern Rhodesian Boundary Commission. A short length of railway in Southern Rhodesia was photographed as an experiment to ascertain the assistance which aerial photography could give to the engineers in their work of straightening and improving the grading of the line.

In addition to the photographic work outlined above, the company's aeroplanes carried geologists of different mining concerns on flights over their particular areas and in at least one case proved the extreme value of air transport in this type of country, by taking a senior official of one of the principal mining corporations on a tour of visits to local mines. The whole tour occupied only one day, whereas had it been undertaken in the normal way, it would have entailed five or six days of uncomfortable travel.

Photography of an area of 1,070 square miles for the Iraq Government was completed. This area is being mapped on a scale of 1/10,000 and covers country in which new irrigation development schemes are expected to be inaugurated shortly. The plotting of the photographs taken in Iraq was undertaken in London, and, by the end of the year, about a quarter of the area had been completed. On completion of the flying operations in Iraq, a small experimental survey of a section of the Nile Valley round El Wasta was carried out for the Egyptian Government Survey Department.

In this country, the work of the subsidiary company, Aerofilms, Ltd., increased and modern factory premises now

give them greatly increased facilities. The company now operates its own aircraft, and over 100 hours photographic flying was completed during the last three months of the year, while more than 150 hours flying was carried out for the principal commercial joy-flying aviation firms from various centres during the season.

In addition to taking the usual air views of business premises and property for commercial and practical purposes a number of small air surveys, chiefly of newly developed districts, main roads, etc., were made by this company for local authorities and estate agents, and five thousand new photographs were taken to meet the increasing demand for aerial pictures.

LIGHT AEROPLANE CLUBS AND PRIVATE FLYING.

Eleven Light Aeroplane Clubs operated throughout the year under the revised scheme mentioned in the last Report, while agreements with two further clubs came into force as from 1st April and 1st September respectively, bringing the total of "approved" clubs to thirteen by the end of the year.

The total membership of these clubs on 31st December, 1928, was 3,288, representing an increase of 50 per cent. since the end of 1927, and of this number 473 held civil pilots' licences, 355 of these having qualified for their licences on club aircraft. Complete statistics are given in Table 9 (page 48).

The increase in the number of civil pilots is reflected in the increased number of privately-owned aircraft, of which 176, including 44 belonging to subsidised clubs, were in service at 31st December, 1928, as compared with 110 and 58 at 31st December, 1927, and 31st December, 1926, respectively.

Excellent though the results of the subsidised light aeroplane movement have been, it has been for some time apparent that under the existing scheme only a small proportion of the widespread and growing demand for flying training and facilities could be met.

Proposals have, however, been submitted by National Flying Services, Ltd., which seem likely to go a considerable way towards meeting this demand for training facilities and for the development of internal flying in this country without proportionately heavy demands on the State for financial assistance.

The promoters of this company propose to establish near London and at provincial centres where the demand exists, civil flying clubs and concomitant amenities. They have undertaken in this connection to provide and maintain, directly or indirectly, 20 new aerodromes and 80 landing grounds within three years.

In addition to providing facilities for instruction and training in flying at these aerodromes, the company will be prepared to provide air transport as occasion arises. The provision of the aerodromes and landing grounds should, apart from their use for training purposes, prove of direct benefit to civil aviation in this country and should serve to stimulate cross-country travel by air.

An agreement is to be entered into between the Air Ministry and the company providing for the payment from Air Votes during a period of ten years of capitation grants in respect of members of clubs associated with the company who qualify for the issue or renewal of pilots' licences. The details of this assistance and the conditions governing the granting of it have been described in a White Paper (Cmd. 3264).

The Automobile Association has taken a useful and important step in connection with private flying by establishing a special branch to give assistance to private owners of aircraft on the lines of that given by them to motorists. Apart from giving assistance in arranging foreign tours, the Association has formed a body of ex Air Force mechanics who attend aircraft meetings for the benefit of its members, and a scheme has also been organised whereby members may drop messages at a number of selected A.A. road posts, asking for arrangements to be made for petrol, housing, cars, hotels, etc., at any aerodrome in Great Britain, these messages being received by the A.A. road patrols and forwarded by them by telegraph or telephone. The scheme is working satisfactorily.

AIR RACES AND COMPETITIONS.

The seventh annual race for the King's Cup was held on 20th and 21st July, 1928, over a course commencing at Hendon aerodrome, extending as far North as Glasgow and finishing at Brooklands aerodrome, a total distance of approximately 11,000 miles. The race was won for the second year in succession by Captain Lawrence Hope on a D.H. "Moth," this being the third successive win for this type of machine. The trophy for the Siddeley Trophy Tour was also competed for on the same occasion and was won by Miss Winifred Spooner, representing the London Aero Club.

Successful air pageants were organised during the course of the year by the Bristol and Wessex, Hampshire, Midland and Lancashire light aeroplane clubs, and served to demonstrate the increasing interest of the public generally in flying.

Two world's records for light aeroplanes in the first category (two-seater) were secured for Great Britain by the following achievements :—

Height:—Mr. and Mrs. G. de Havilland on a D.H. "Moth," 27th July, 1928, 6054 metres (19,862 ft.).

Speed over 100 *kilometers*:—Mr. and Mrs. A. S. Butler, on a D.H. " Moth," 7th December, 1928, 192·864 kms. per hour (119·841 m.p.h.).

On 4th November, 1928, Flt. Lt. D'Arcy A. Greig, flying the Supermarine-Napier S.5 on which the Schneider Trophy was won in 1927, established a British speed record by achieving a speed of 319·57 m.p.h.

LONG DISTANCE FLIGHTS.

The great progress made in aircraft design from the reliability point of view, and the improved knowledge of the conditions affecting air navigation in various parts of the world, have resulted in recent years in an ever-increasing number of successful long-distance flights, with the result that such flights are no longer necessarily of sufficient historic importance to justify special mention in a report of this nature. Only flights which were record-breaking or otherwise of special significance are, therefore, mentioned below.

One of the most important achievements by foreign aviators was the accomplishment of the first direct East to West crossing of the North Atlantic. This flight was carried out on a Junkers W.33 machine, fitted with a 280–310 h.p. Junkers L.5 engine, by Captain Hermann Koehl, Baron von Huenefeld and Commandant J. Fitzmaurice, who left Baldonnell, Ireland, at 5.38 a.m. on 12th April, 1928, and landed on Greenly Island off the coast of Labrador 37 hours later, having flown a distance of approximately 2,180 miles.

The following were among the most important British long-distance flights during 1928 :—

Mr. Bert Hinkler (now Squadron Leader B. Hinkler, R.A.A.F.) on an Avro " Avian " with " Cirrus " engine. London–Australia (approximately 11,500 miles) in 16 days from 7th to 22nd February, 1928. This flight was the longest ever made by a pilot flying solo, was the longest flight to date by a light aeroplane, and constituted a record flight between England and Australia.

Sir A. J. Cobham on a Short " Singapore " flying boat with two Roll-Royce " Condor " engines. Survey flight round Africa via Cairo, River Nile, Cape Town, and the West Coast of Africa; total distance approximately 23,000 miles. Left Rochester 17th November, 1927, and arrived back 4th June, 1928.

Lady Bailey on a D.H. " Moth " with " Cirrus " engine. London–Cape Town via Cairo, returning to London via Belgian Congo and West Coast of Africa; total distance approximately 18,000 miles. Outward journey 9th March, 1928–30th April,

1928; homeward journey 21st September, 1928–16th January, 1929. Longest solo light aeroplane flight to date, the return journey being the first light aeroplane flight over that route.

Mr. C. D. Barnard and Mr. E. H. Alliott on a Fokker F.VII with Bristol "Jupiter VI" engine. Karachi–London (4,486 miles). Was accomplished in 4½ days between 2nd September, 1928, and 6th September, 1928, and constituted, up to the end of 1928, the record flight between India and England.

Lieutenant P. M. A. Murdoch (South African Air Force) on Avro "Avian" with "Cirrus" engine. Lympne–Cape Town via Cairo (8,300 miles), 30th July, 1928–12th August, 1928. Record flight England to Cape Town.

Lieutenant R. R. Bentley, M.C., A.F.C. (South African Air Force) on D.H. "Moth" with "Cirrus" engine. Cape Town–London via Cairo (8,300 miles), 20th February, 1928–12th May, 1928, and London–Pretoria via Cairo (7,450 miles), 19th October, 1928–22nd December, 1928. The latter was Lieutenant Bentley's third flight between England and South Africa, all three flights having been accomplished on the same machine.

Captain Kingsford Smith, Mr. Ulm, Lieutenant Lyons and Mr. Warner on Fokker monoplane with three Wright "Whirlwind" engines. Oakland (California)–Sydney via Honolulu and Suva (Fiji), (7,330 miles). Constituted the first flight across the Pacific Ocean, and involved a stage of 3,138 miles (from Honolulu to Suva) across water.

UNIVERSITY AIR SQUADRONS.

The membership of the University Air Squadrons at Oxford and Cambridge during 1928 remained at 75 per squadron, the same number as in 1927. It is not likely that these totals will be increased at present owing to the difficulty of affording instructional facilities for a larger number. Solo flying during term time has now been sanctioned at Oxford University bringing both universities on to the same footing in this respect.

The Cambridge Squadron maintains a close liaison with the Faculty of Engineering, and experiments are frequently carried out in the wind tunnel belonging to the squadron. Members of the squadron are now permitted to act as observers in full scale aeronautical research experiments conducted in the engineering laboratory, subject to the approval of the Chief Instructor.

The certificate of proficiency is taken by the majority of members. In the Cambridge squadron 13 members, and in the Oxford squadron 11 members, received certificates up to 31st December, 1928.

The annual attachments to a Royal Air Force unit took place as usual during 1929, Oxford at Manston, and Cambridge at Old Sarum. The strength of the Cambridge squadron at the annual attachment was 73, of which 45 were capable of flying solo by the end of the attachment, 18 of the latter having flown solo previously. The strength of the Oxford squadron at the annual attachment was also 73, out of which 33 flew solo, 7 having flown solo previously. The difference between the numbers of solo flyers in the two squadrons is due to the fact that Cambridge obtained prior sanction for solo flying in term time.

TRAINING OF RESERVE OFFICERS.

The five civil schools engaged in the flying training of officers of the Royal Air Force Reserve completed 528 Refresher Courses and 80 *ab initio* Courses during 1928, the corresponding figures for the 12 months ended 31st December, 1927, being 475 and 39 respectively.

CHAPTER II.

GROUND ORGANISATION.

Continued progress has been made in the improvement of the ground organisation on the regular air routes, all such improvements conforming as far as possible to the decisions reached by the International Commission for Air Navigation and the recommendations of the International Aviation Conferences which have taken place periodically between the authorities of the interested States.

AIRPORTS AND LANDING GROUNDS.

The re-construction of Croydon Aerodrome which was commenced in 1925 has now been completed with the exception of certain minor details. The new buildings were finished during the earlier part of the year and were declared open by the Lady Maud Hoare on the 2nd May. The hotel building was opened to the public on the 10th May.

Work in connection with the demolition of the old buildings adjoining Plough Lane and the levelling of the site of these buildings and of the surface of Plough Lane was continued, but it is not considered that this part of the aerodrome will be ready to be taken into use before the latter part of 1929.

In addition to the two large double hangars, with a total floor space of 90,000 sq. ft. for aircraft storage and 36,000 sq. ft. for offices, workshops, etc., which form part of the new buildings, the permanent hangar built for the National Aircraft Factory, has been acquired by the Air Ministry as from the 1st January, 1929, providing further floor space of 108,000 sq. ft. for the housing of aircraft and 72,000 sq. ft. for workshop accommodation. The latest type of compass-swinging base has been installed on the aerodrome to facilitate the adjustment of aircraft compasses.

At Lympne aerodrome the number of landings and housings of aircraft during 1928 showed a material increase as compared with 1927, the presence of the Cinque Ports Flying Club contributing to the increase in receipts and greater activity at that aerodrome.

Marden (Kent) landing ground has been marked by means of a white circle and the name " Marden " in large chalk letters. The landing grounds at Littlestone and Penshurst were extensively used throughout the year, particularly during the prevalence of fog.

On the 29th October the Air Ministry issued a circular letter addressed to the Town Clerks of all municipalities in Great Britain with a population of 20,000 and above, calling the attention of their corporations to the necessity of establishing municipal aerodromes in order that full advantage might be taken of air transport.

A gratifying interest in the matter was taken by municipal authorities as the result of the letter, and by the 31st December the following towns, including those which had taken previous action in the matter, had already had sites inspected for them by the Air Ministry.

Bristol.
Basingstoke.
Carlisle.
Derby (Alvaston).
Leeds.
Portsmouth.
Leicester.
Scarborough.
Skegness.
Morecambe.
Ipswich.
Rotherham.
Burton-on-Trent.
Blackpool.
Manchester.
Sheffield.
Worthing.
Littlehampton.
Bognor.
Plymouth.
York.

In addition to the above the following towns applied to have sites inspected.

Stoke-on-Trent.
Bournemouth.
Birmingham.
West Bromwich.
Kidderminster.
Bradford.
Nottingham.
Glasgow.
Derby.
Hull.

A further thirteen towns had displayed sufficient interest in the establishment of a municipal aerodrome to seek Air Ministry advice on the matter.

In the light of the experience gained by the Air Ministry in the inspection of these sites and of the experience gained in other countries a pamphlet entitled "Notes on the Location, Size and General Requirements of a Site for a Civil Aerodrome," has been prepared, and the intention is that these notes will enable the borough or city engineer definitely to choose certain sites as being suitable for an aerodrome and then obtain expert advice on the final selection only.

Until a recent date the Air Ministry has had to carry out the whole of the work of advising local authorities upon the selection of sites for aerodromes and has, in some instances, provided specimen schemes for their lay-out and equipment. It has been decided that, in future, most of this work should devolve upon commercial firms, the responsibility of the Air Ministry being confined to matters connected with the licensing of aerodromes under Section 7 of the Air Navigation (Consolidation) Order of 1923.

A scheme has been drawn up under which commercial firms may submit their proposals to the Air Ministry before work on an aerodrome is commenced and thus avoid the possibility of an aerodrome being established and then not meeting the requirements of the Air Ministry for license purposes. One firm has already been approved by the Air Ministry as competent to advise on the selection of sites for and establishment of aerodromes, and others are likely to seek similar approval.

The Air Ministry will for the present, however, in accordance with the circular letter dated 29th October, addressed to local authorities, continue to assist by advising generally upon the selection of sites.

ROUTE ORGANISATION AND LIGHTING.

No satisfactory advance has been made in the Leader Cable experiments mentioned in the last Report and the question of the installation of this apparatus at Croydon is still in abeyance. It was originally intended that the system of Neon tubes sunk in the ground to assist pilots landing in foggy weather should be used in conjunction with the Leader Cable but it has been definitely decided to install the former apparatus at Croydon aerodrome without waiting until a definite decision regarding the cable can be arrived at.

A second type of illuminated wind sleeve for indicating the direction of the wind to pilots at night has been tried out but was, unfortunately, not found to be of any use. There is under consideration, however, the installation of a landing T which, owing to its white upper surface, will be clearly visible to pilots by day, and, being outlined with Neon tubes, will be equally visible by night. This device will automatically indicate to the pilot at all hours the direction of the wind, and it is hoped shortly to be able to combine with it an automatic device for indicating, both by day and by night, the strength of the wind.

The old Neon Beacon at Croydon aerodrome has been reconstructed, and has been re-erected on the south-east corner of " B " hangar.

At Lympne aerodrome a Neon Beacon similar in construction to the one at Croydon, but different in character has been erected. This beacon will be a clear and definite landmark for pilots crossing the English channel by night, and will be of especial assistance in conditions of bad visibility.

During the year 1927 the two marine lighthouses at Dungeness and South Foreland were partially unmasked in order to assist pilots flying by night. The experiment proved successful enough to warrant the complete unmasking of these lights, which was duly effected during 1928.

The floodlight mounted on a Crossley-Kegresse tractor in use at Croydon aerodrome has proved itself very satisfactory and

reliable. This apparatus was originally fitted with an arc lamp, but a ten (10) kilowatt double filament lamp is now used. A double filament is used in order to ensure, as far as possible, against complete failure of the lamp while a landing is in progress.

The improbable, but nevertheless possible, contingency of the simultaneous failure of both filaments has been provided against by mounting the lamp on a movable self-focussing tray in such a manner that the spare lamp and tray which are carried on the tractor can be easily substituted, entailing a delay of only two minutes from the failure of the original lamp to the time that the new lamp is fully incandescent.

CAIRO-KARACHI ROUTE.

It has been decided to arrange for night flying over the section of this route between Baghdad and Basrah, and, with this end in view, a self-contained mobile and rotating floodlight similar to the one in use at Croydon, which will act as a combined beacon and floodlight, is to be installed both at Baghdad and Basrah.

NAVIGATION.

The International Commission for Air Navigation has again postponed the operation of the new rules with regard to the licensing of navigators until 1st January, 1930.

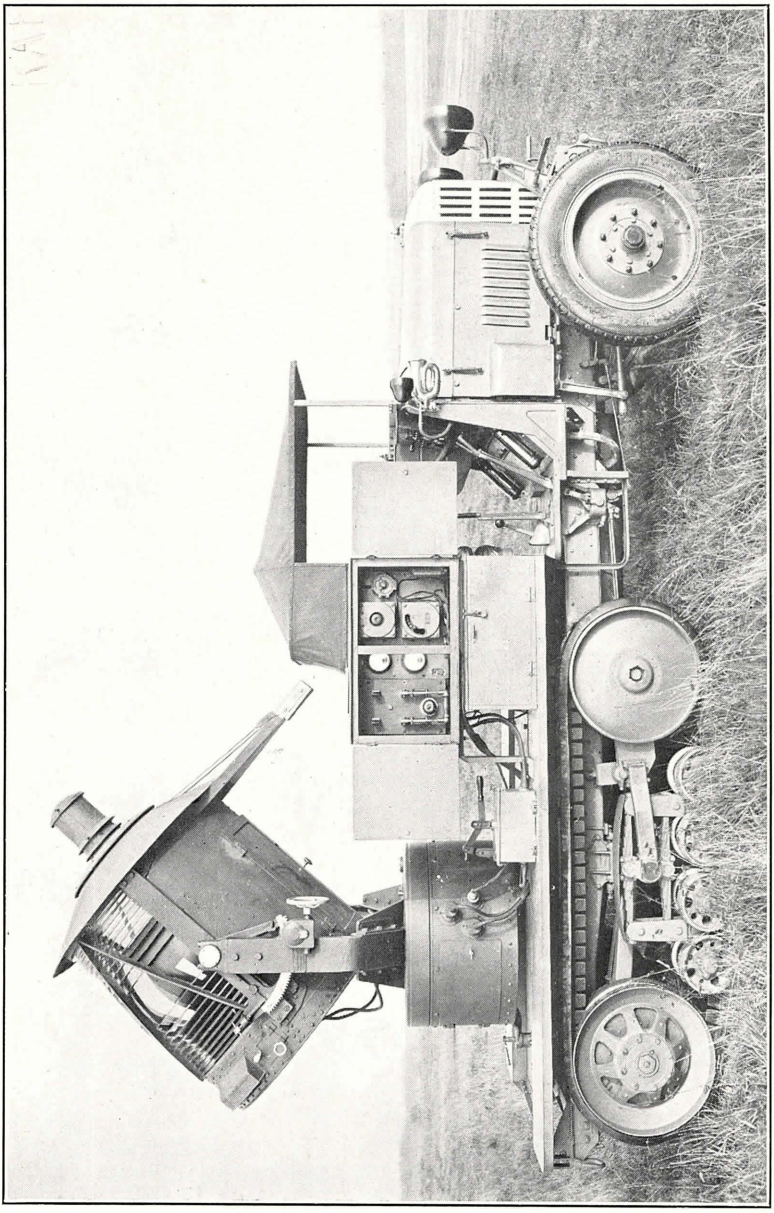
The course of lectures on Navigation and Meteorology for officers of the Royal Air Force Reserve, referred to in the last report, was continued until Easter 1928. It has not been possible, however, to arrange any further official courses, and owing to the lack of a suitable civil navigation school, it is now, therefore, difficult for candidates for navigators' licences to attain the standard required by the Air Ministry examinations. This fact is reflected in the higher proportion of failures since the official course was discontinued.

The re-draft of the Rules for Lights and Signals (Section I, Annexe D, of the International Convention) is still under consideration by the International Commission for Air Navigation.

MAPS.

In the interests of economy the preparation of further sheets of the International General Aeronautical Map series has again been suspended.

The following sheets are, however, now available, viz., Great Britain, Balkans, Egypt, Iraq, Baluchistan, Kordofan, Yemen and Oman, which, together with the sheets prepared by other countries, cover, with one small exception in Italy, the whole of the routes normally flown over between this country and India.



Mobile Rotating Floodlight, Croydon Aerodrome.

no effect on the performance or control. Brief particulars of the construction and performance are as follows :—

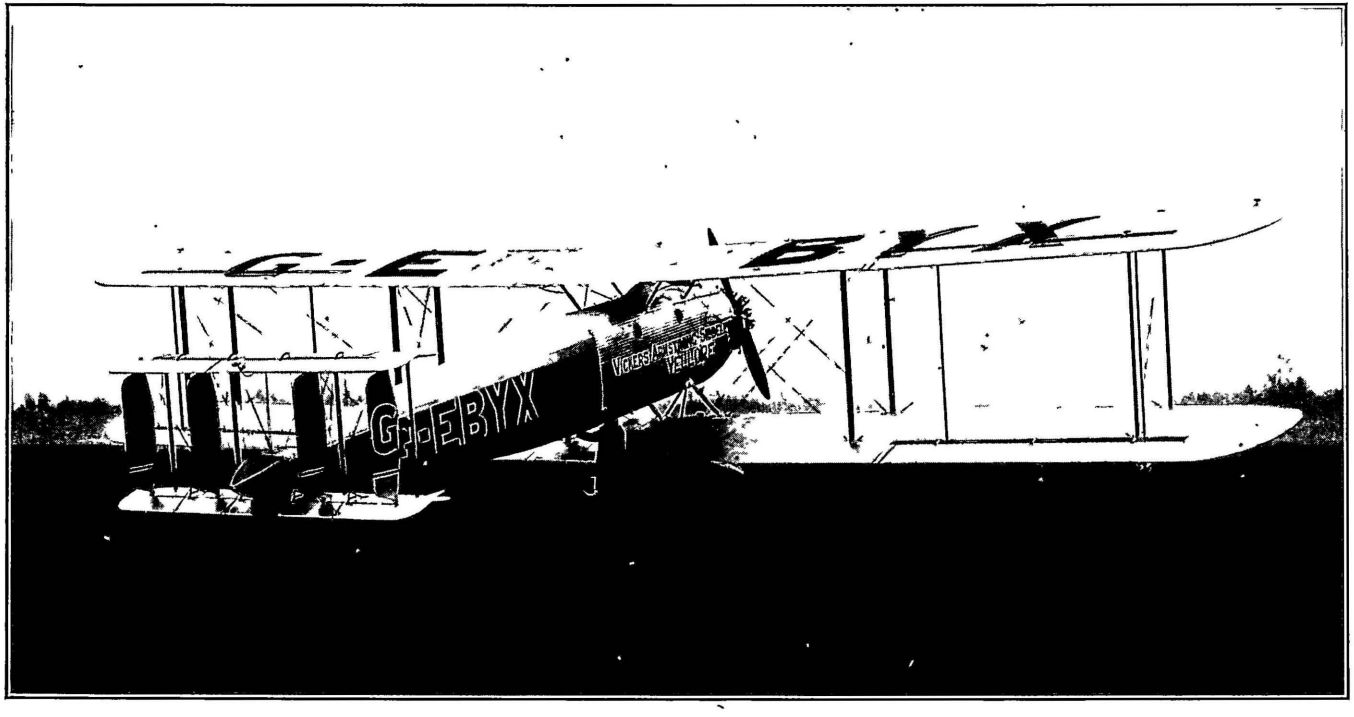
Engines	3 geared Bristol Jupiter, totalling 1,500 h.p.
Hull	Duralumin.
Wings	Duralumin, fabric covered.
Total weight	20,817 lbs.
Paying load	4,690 lbs. (15 passengers).
Top speed at sea level ...	120 m.p.h.
Take-off time with full load ...	18·5 secs. (360 yards).
Rate of climb at sea level ...	710 ft. per min.
Landing speed	60 m.p.h.
Landing run	183 yds.
Depth of water required to float	2 ft. 10 ins.

During the year, the Vickers " Vellore," a freight-carrier fitted with a single 485 h.p. geared Bristol Jupiter IX engine, was produced to the order of the Air Ministry, but has since been lost while on a flight to Australia. The high paying load per horse power, combined with a moderately good speed, was the distinctive feature of this type. The aircraft was designed for the carriage of heavy freight, and the freight compartment, which was provided with special loading apparatus, was, therefore, relatively small, having a capacity of only 225 cubic feet. The salient features of the construction and performances were :—

Fuselage	Fore part—duralumin. Rear part—duralumin, covered with lath and fabric.
Wings	Duralumin, covered with fabric.
Total weight	9,500 lbs.
Pay load	3,728 lbs (39 per cent. of total load).
Pay load per horse power ...	7·1 lbs.
Top speed	104 m.p.h.
Take-off run	199 yds.
Rate of climb	550 ft. per min.
Landing speed	48 m.p.h.
Landing run	205 yds.

It is noteworthy that the useful load of 4,950 lbs. carried by the " Vellore " was greater than the weight of the aircraft.

Construction was commenced by Short Bros., Ltd., of Rochester, to the order of the Air Ministry, of a large 3-engined monoplane twin-float seaplane of all-metal construction. This will probably be the largest float seaplane ever constructed and, being of comparable size, will provide an interesting comparison with the " Calcutta " flying boat.



Vickers "Vellore."

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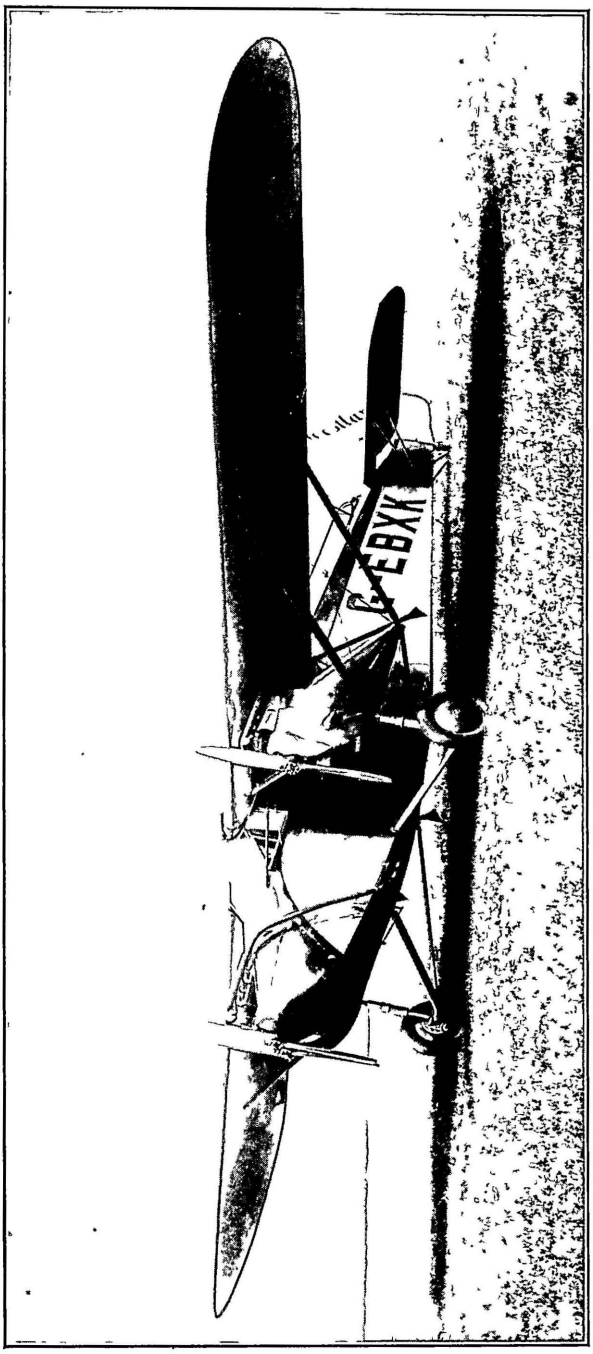


Westland "IV" Three-Engined Limousine.

The engines are 485 h.p. geared Bristol Jupiter IX, and a maximum speed of 136 miles per hour is expected. Seating accommodation for 17 passengers is provided, and the total pay load is expected to be approximately 3,600 lbs.

The 4-passenger cabin class of machine which has become popular in America, but which had hitherto been represented in England only by the D.H. 50, began to receive the renewed attention of British constructors. The De Havilland " Hawk Moth," a monoplane fitted with one 230 h.p. Armstrong Siddeley Lynx engine was produced during 1928, and since the close of the year other constructors have also produced machines in this class, two of them being 3-engined machines. The earliest of the latter, the Westland IV, is illustrated.

ENGINES.

The De Havilland " Gipsy " engine, with which, as already mentioned, the " Moth " is now normally fitted, passed its type tests in March, 1928. An experimental version of this engine was first produced in July, 1927, and was designed to give an output of 135 h.p. In this form the engine was installed in the D.H. " Tiger Moth," which secured a world record for light aeroplanes by achieving a speed of 186 m.p.h. For commercial purposes the production type engine is rated at considerably lower power and revolutions than the experimental version, but has identical bearing surfaces and main components, thus ensuring long life and reliability. Particulars of the " Gipsy " engine are as follow :—

Bore	114 m.m (4·488 in.).
Stroke	128 m.m. (5·039 in.).
Compression ratio	5 : 1.
Normal output	90 B.H.P. at 1,900 r.p.m.
Maximum power	100 B.H.P. at 2,100 r.p.m.
Petrol consumption	·59 pints per h.p. hr. at full throttle.
Oil consumption	·5–·75 pints per hour.
Weight, with airscrew boss ...	282 lbs.
Overall length	43 ins.

The " Gipsy " engine, in addition to being manufactured in England is also produced in the United States by the Wright Aeronautical Corporation.

Following upon the success of the " Cirrus " engine, series II and III, the manufacturers have produced the " Hermes," a four-cylinder in-line type similar to the former engines, but of higher power. The new engine underwent flying tests at Croydon aerodrome in April, 1929.

Particulars of the " Hermes " engine are as follow :—

Bore	114 m.m. (4·488 in.).
Stroke	140 m.m. (5·118 in.).
Compression ratio	5·1 : 1.
Normal output	105 B.H.P. at 1,900 r.p.m.
Maximum power	115 B.H.P. at 2,100 r.p.m.
Petrol consumption	·58 pints per h.p. hr. at full throttle.
Oil consumption	1–1½ pints per hour.
Weight, with airscrew boss ...	295 lbs.

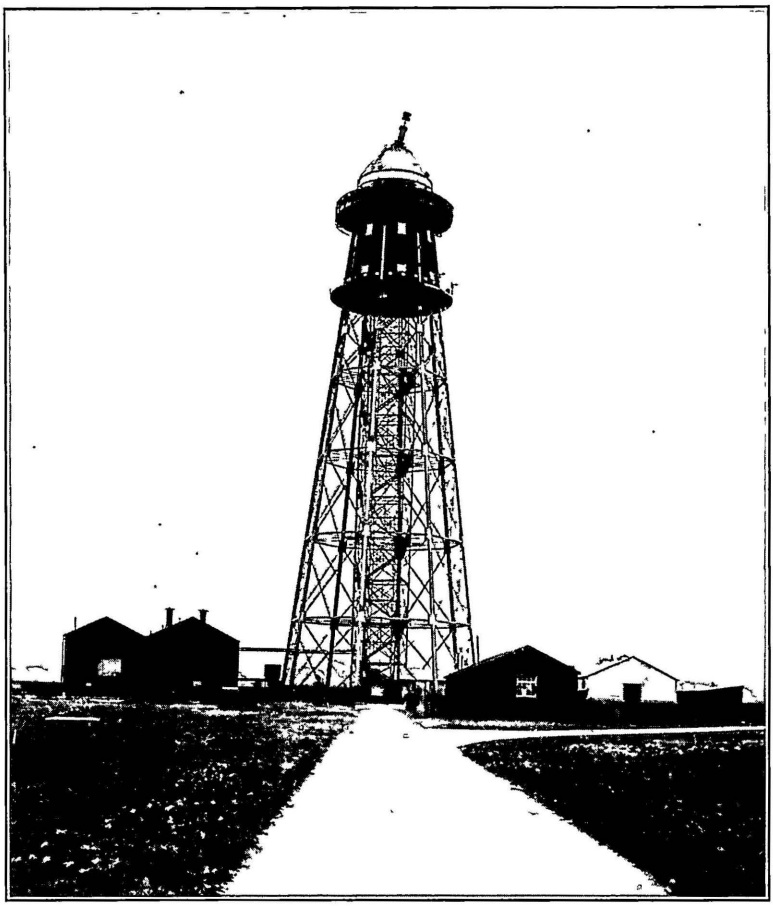
Overall dimensions—Length 38·4 ins, Height 36 ins., Width 19 ins.

AIRSHIPS.

At the date of going to press, both airships are being inflated, the R.100 at the Airship Guarantee Company's establishment at Howden, East Yorks, and the R.101 at the Royal Airship Works, Cardington.

On completion of inflation they will be put through certain trials in their sheds, preparatory to undergoing flight trials. It is hoped that both airships will make their first flight by the end of September.

So far as work services are concerned, the two sheds and mooring tower at Cardington, and the mooring towers at Ismalia and Montreal are complete and ready for operations. At Karachi the shed is complete except for certain alterations to the doors, whilst the mooring tower is nearly finished. Both should be ready for operations by the end of the year.



Mooring Tower, Cardington.

CHAPTER IV.

ADMINISTRATION.

RELATIONS WITH FOREIGN COUNTRIES.

The number of States who have become parties to the Convention for the Regulation of Aerial Navigation (Paris, 13th October, 1919) now totals 26, one additional State, namely Holland, having adhered on 22nd August, 1928. The following is a complete list of signatory States :—

Great Britain and Northern Ireland.
Australia.
Canada.
India.
Irish Free State.
New Zealand.
Union of South Africa.
Belgium.
Bulgaria.
Chile.
Czechoslovakia.
Denmark.
France.
Greece.
Holland.
Italy.
Japan.
Persia.
Poland.
Portugal.
Roumania.
Saar Territory.
Kingdom of the Serbs, Croats and Slovenes.
Siam.
Sweden.
Uruguay.

The permanent International Commission instituted in accordance with Article 34 of the Convention held its 14th Session in Geneva on 8th–11th June, 1928 at the seat of the League of Nations.

The 26th and 27th of the series of Conferences arranged between the civil air administrations of Great Britain, France Belgium, Holland, Switzerland, Czechoslovakia and Germany for the purpose of discussing questions arising out of the operation of regular air services in which these countries have an interest were held during the year at Berlin and The Hague respectively.

An International Civil Aeronautics Conference, attended by representatives of the Air Ministry, was held in Washington on 12th–14th December.

The provisional air traffic agreements with Holland, Norway, Switzerland and Germany have continued in force. Preliminary negotiations for a similar agreement with Spain have been re-opened.

MEDICAL SERVICES.

In the course of the year the number of applicants for " A " licence was 564 of whom 542 were passed as fit, 12 as temporarily unfit and 10 were rejected.

In connection with " B " licences there was 268 examinations for renewal of licence in respect of 203 applicants. Of these, 194 were classified as fit, 3 as temporarily unfit and 6 as unfit.

111 examinations were held in respect of 96 new applicants for Licence " B " ; of these 76 were found to be fit, 6 temporarily unfit and 14 unfit.

The method of assessment of fitness by means of a physical index, as outlined in the last report, was continued during 1928 and it is gratifying to record that the high average figure has been maintained in respect of all groups of civilian pilots holding the " B " Licence.

As previously mentioned, the comparison of the index given by the various re-examinations of the same individual carried out during the year, enables an idea to be formed as to whether flying duties are imposing any undue strain upon a pilot, and also enables appropriate advice to be given where necessary as to the means to be employed for the recovery of full efficiency.

During the year, flights were made in several types of machines, both British and foreign, in order to study the question of comfort in air travel from the medical point of view. The following suggestions have been made as the result of these investigations :—

(i) Cabins should be ventilated by means of an inlet and extractor air system in order to obtain adequate circulation of air from front to rear of the cabin.

(ii) Cabins should be heated by means of warm air giving warmth to the feet and lower part of the body.

By means of (i) and (ii) cool air would be obtained at head level and warm air at foot level, these conditions being essential for comfortable ventilation.

(iii) Steps should be taken to mitigate noise by removing the engines so far as possible from the cabin, by employing lagging where necessary, by damping noise with soft upholstery, and by ensuring that no part of the structure, such as the rip-cloth emergency exit, is free to vibrate.

(iv) Deafness and tinnitus should be mitigated by the provision of special ear defenders in the place of cotton wool.

(v) Attempts should be made to mitigate air sickness (*a*) by better ventilation, (*b*) by giving the passenger as free

a view of the horizon as possible through large windows, (*c*) by flying, when possible, at a height of 2,000 feet or over, (*d*) by removing all objects likely to catch the eye and give an exaggerated idea of uneven movement of the aeroplane, (*e*) by removing vomit receptacles from sight so far as is possible, and (*f*) by providing interest for the passengers in order to distract attention from the possibility of air sickness.

(vi) The w.c. design should be improved.

(vii) The pilot should be better protected, thereby diminishing fatigue and preserving efficiency.

INVESTIGATION OF ACCIDENTS TO CIVIL AIRCRAFT.

British Aircraft.

During the twelve months under review there were altogether twenty-nine accidents to which Air Navigation (Investigation of Accidents) Regulations, 1922, were applicable. Of these, twelve resulted in loss of life, six caused severe but non-fatal injuries to persons, and eleven had no serious consequences beyond structural damage to the aircraft. Half the total number of major accidents involved machines belonging to light aeroplane clubs.

It is satisfactory to record that for the fourth successive year no passenger travelling in a British aircraft on the scheduled services was injured. One machine belonging to Imperial Airways met with disaster, but this occurred during a test flight. Only four accidents occurred to aircraft actually flying for hire, none having fatal consequences.

The accidents may be classified according to the various flying organisations as follows :—

	Fatal.	*Involving serious injury.*	*Minor.*	*Total.*
1. Regular air transport ...	1*	—	—	1
2. Other flying for hire ...	1*	3	4†	8
3. Light aeroplane clubs ...	6	2	1	9
4. Private flying	1	1	4‡	6
5. Schools	1	—	2	3
6. Air-racing	1	—	—	1
7. Constructors' test flights...	—	—	1	1
	11	6	12	29

* Test flights.

† One of these was during an exhibition flight, one during a flight transferring joy-riding headquarters from one point to another and one during a test flight.

‡ One case involved the death of a third party on the ground.

(6) An error of judgment on the part of the pilot caused the aeroplane to stall during a climbing turn at a low altitude. The machine nose-dived to the ground and an outbreak of fire occurred on impact. Both the occupants were killed.

(7) The aircraft struck a flagstaff near the boundary of the aerodrome while the pilot was manœuvring to land. The machine fell to the ground out of control and was wrecked, but the pilot, the sole occupant, was only slightly injured.

(8) The pilot was thrown out of his aeroplane owing to the safety-belt breaking during an aerobatic manœuvre at a height of about 800 feet.

(9) The pilot failed to effect recovery from a stalling turn leading to a spin which occurred at a height of about 300 feet. The aeroplane struck the ground at a steep angle and the passenger in the front cockpit was killed. The pilot was injured. The evidence available after the accident strongly suggested that the passenger accidentally interfered with the movements of the dual control gear during the spin.

4. *Private Flying.*—

(1) At the conclusion of a cross-country flight planned to advertise a local cinema, the pilot attempted to land in a somewhat small field which had been selected for the purpose, and round which a large crowd of people had assembled. After alighting successfully, the pilot realized that the machine was not going to pull up before reaching the boundary of the field, and being unable to swing round either to left or right owing to the crowd invading the field, opened-up the engine and attempted to take off. The aeroplane, however, hardly left the ground before it crashed into a high wall at the end of the field. The pilot and passengers were uninjured, but a child was struck by the aeroplane and killed.

(2) The engine failed while the aircraft was climbing from the ground and was over the boundary of the aerodrome. The pilot attempted to land in an adjacent field, but the aeroplane struck the top branches of a tree and crashed to the ground. The pilot and passenger escaped injury. The failure of the engine was due to the flow of petrol to the carburetter being obstructed by a loose piece of solder in the main tank sump.

(3) An error of judgment on the part of the pilot caused the aeroplane to stall and nose-dive to the ground from a height of about 50 feet. The pilot had very little flying experience and this was his first solo flight in a light aeroplane. He escaped injuries of any consequence.

(4) During the course of a private instructional flight, the pupil executed a faulty turn and put the aeroplane into a spin at a height of about 800 feet. The pilot, who was seated in the front or passenger cockpit, immediately took over control and

applied the usual correction for a spin, but this had little or no effect and the aeroplane failed to recover completely from the spin before it struck the ground. The pilot sustained serious injuries involving the loss of a leg, but the passenger suffered only severe shock. The failure of the aircraft to recover from the spin was afterwards found to be due to an omission on the part of the pilot to couple up the dual rudder bars before starting on the flight.

(5) The pilot accidentally stalled his machine in a sharp turning manœuvre at a height which did not permit of a complete recovery from the resultant spin. The aeroplane struck the ground at an angle of about 45 degrees and the pilot, the sole occupant, was killed.

(6) While attempting to navigate in thick cloud over hilly country, the pilot completely lost control of his aeroplane, and when he caught sight of the ground he had not sufficient height in which to recover normal flight. The aeroplane struck the ground on an almost level keel, but the undercarriage collapsed and the machine, after skidding over the ground some distance, was wrecked. The pilot was unhurt.

5. *Schools.*—

(1) The aeroplane lost flying speed in a glide towards the aerodrome, and fell to the ground from a height of about 30 feet. The pilot (a pupil) was slightly injured.

(2) An error of judgment on the part of the pilot (a pupil with about eleven hours solo flying experience) caused the aeroplane to stall during a turn shortly after taking-off. From a height of about 150 feet the aeroplane dived almost vertically to the ground. The pilot was fatally injured.

(3) The pilot (an instructor) accompanied by a pupil took off in a down-wind direction and with an insufficient margin of flying speed. From a height of about 60 feet the aeroplane side-slipped to the ground and finally crashed into a fence on the boundary of the aerodrome. Neither of the occupants of the aeroplane was injured. The accident was attributable to an error of judgment on the part of the instructor.

6. *Air Racing.*—

The aircraft failed to arrive at its destination in the fourth section of the King's Cup Race, and three days later the wreckage of the machine, together with the dead body of the pilot, was found near the summit of one of the highest hills south of the River Tweed. From the marks on the ground and the disposition of the wreckage, and having regard to the weather conditions which prevailed in this part of the country on the day of the race, it was evident that the aircraft had flown into the side of the hill while the pilot was navigating in thick mist.

TABLE 1.

British Commercial Aviation (excluding Cairo-Basrah Service : see Table 7).

Period.	Part I. Air Transport. Aircraft Flights.	Part I. Air Transport. Aircraft Mileage.	Part I. Air Transport. Passengers carried.	Part I. Air Transport. Cargo carried (tons).	Part II. Other Flying for Hire. Aircraft Flights.	Part II. Other Flying for Hire. Aircraft Mileage.	Part II. Other Flying for Hire. Passengers Carried.
1928.							
January	199	38,000	679	36·5	261	2,000	443
February	247	46,000	867	44·1	841	4,000	1,188
March	354	64,000	1,710	51·6	1,669	6,000	2,306
April	458	75,000	2,110	45·6	5,292	22,000	9,903
May	626	107,000	2,561	65·1	5,672	30,000	11,405
June	821	131,000	3,501	73·1	4,283	20,000	10,534
July	747	130,000	4,170	101·6	10,228	48,000	21,780
August	834	142,000	4,687	97·2	9,786	46,000	18,982
September	634	108,000	3,481	87·5	6,876	38,000	13,638
October	446	86,000	2,037	77·4	2,784	14,000	5,275
November	313	51,000	1,156	51·2	1,047	5,000	1,896
December	187	33,000	700	41·4	171	1,000	269
Total, 1928	5,866	1,011,000	27,659	772·3	48,910	236,000	97,619
1927 Total	4,450	769,000	18,874	593·1	44,445	222,000	90,695
1926 Total	4,777	840,000	16,775	679·0	42,843	215,000	81,909
1925 Total	4,424	862,000	11,193	550·0	33,061	169,000	66,503
1920–24 Yearly Average	3,419	693,000	10,120	248·4	20,744	183,000	35,632
1919 (8 months) Total	467	104,000	870	30·0	34,953	494,000	63,546
Total : May, 1919 to December, 1928	37,080	7,051,000	— See note (iv.)	— See note (iv.)	307,934	2,249,000	578,430

NOTES.—(i) Prior to 1922, " Other flying for hire " includes a small amount of private flying (i.e., not for hire or reward). The statistics are compiled from returns rendered voluntarily by the various firms ; some firms, however, have not rendered returns.

(ii) A separate Table is given (Table 9, page 48) of flying by subsidised Light Aeroplane Clubs.

(iii) Air Transport (Part I) commenced in August, 1919, and Other Flying (Part II) in May, 1919.

(iv) *See* notes on page 38 as to passengers and cargo carried.

TABLE 2.

Aircraft Flights and Passengers carried between Great Britain and the Continent (excluding Channel Islands).

Period.	Nationality of Aircraft.												Total British and Foreign.		Percentage of British to Total.	
	British.		Foreign.													
			Belgian.		French.		German.		Netherlands.		Others.					
	Flights.	Passengers carried.	Flights.	Passengers carried.	Flights.	Passengers carried.	Flights.	Passengers carried.	Flights.	Passengers carried.	Flights.	Passengers carried.	Flights.	Passengers carried.	Flights.	Passengers carried.
1928															%	%
January	133	663	39	19	70	173	43	49	52	110	—	—	337	1,014	39	65
February... ...	150	866	40	28	97	322	39	47	54	170	—	—	380	1,433	39	60
March	207	1,389	52	41	134	408	52	134	63	253	—	—	508	2,225	41	62
April	233	2,022	50	85	153	694	60	210	60	321	—	—	556	3,332	42	61
May	305	2,365	58	210	194	843	127	243	92	532	—	—	776	4,193	39	56
June	365	3,116	60	238	191	968	106	198	112	688	2	2	836	5,210	44	60
July	402	3,635	63	445	248	1,606	114	366	190	1,165	—	—	1,017	7,217	40	50
August	439	4,084	70	534	303	1,759	117	329	219	1,158	—	—	1,148	7,864	38	52
September ...	336	2,897	56	271	196	915	104	203	127	629	—	—	819	4,915	41	59
October	247	1,962	54	110	138	514	53	186	54	279	2	1	548	3,052	45	64
November ...	179	1,122	37	50	84	241	46	114	49	191	—	—	395	1,718	45	65
December ...	124	689	31	33	57	119	36	50	42	115	—	—	290	1,006	43	68
Total, 1928 ...	3,120	24,810	610	2,064	1,865	8,562	897	2,129	1,114	5,611	4	3	7,610	43,179	41	57
1927 Total ...	2,489	16,533	353	1,466	1,534	5,199	625	1,972	807	3,586	6	8	5,814	28,764	43	57
1926 Total ...	2,879	15,450	243	1,105	1,517	6,368	153	233	726	2,352	2	16	5,520	25,524	52	61
1925 Total ...	2,891	10,602	—	—	1,640	7,753	71	194	684	2,163	4	9	5,290	20,721	55	51
1920–24 Yearly Average	2,418	8,590	184	150	1,220	2,992	28	48	412	712	12	3	4,274	12,495	57	69
1919 (4 months)	467	870	—	—	64	52	—	—	—	—	—	—	531	922	88	95
Total, August, 1919 to December, 1928	23,937	111,213	2,127	5,384	12,718	42,895	1,888	4,766	5,391	17,270	75	49	46,136	181,577	52	61

TABLE 5.

Imperial Airways, Ltd.
Efficiency of European Scheduled Services.

Period.	Total flights.						Scheduled flights. Percentage completed.		Flights commenced. Percentage completed.	
	Scheduled	Cancelled.	Commenced.	Completed uninterrupted.	Completed after interruption.	Interrupted and not completed.	Without interruption.	With or without interruption.	Without interruption.	With or without interruption.
1928.							%	%	%	%
January–March	699	61	638	556	68	14	79·5	89·3	87·1	97·8
April–June	1,310	23	1,287	1,230	52	5	93·9	97·9	95·5	99·6
July–September	1,702	19	1,683	1,614	58	11	94·8	98·2	95·9	99·3
October–December ...	855	121	734	620	93	21	72·5	83·4	84·5	97·1
Total, 1928 ...	4,566	224	4,342	4,020	271	51	88·0	94·0	92·6	98·8
January–December, 1927	4,075	285	3,790	3,432	319	39	84·2	92·0	90·6	99·0
January–December, 1926	4,374	374	4,000	3,715	239	46	84·9	90·4	92·9	98·8
January–December, 1925	5,018	932	4,086	3,724	304	58	74·2	80·3	91·1	98·6
April–December, 1924 ...	4,505	924	3,581	3,273	255	53	72·6	78·3	91·4	98·5

NOTES.—(1) The figures for 1927 and 1928 include a few special air transport flights in addition to scheduled services on the regular routes.
(2) Details are not available before April, 1924.

TABLE 6.

Imperial Airways, Ltd.

Causes of Involuntary Landings on European Services.

Period.	Total flights commenced.	Cause of landing.				Percentage of total involuntary landings due to			Percentage of total flights commenced, interrupted all causes.
		Weather.	Mechanical failure.	Miscellaneous reasons.	Total.	Weather.	Mechanical failure.	Miscellaneous reasons.	
1928.						%	%	%	%
January–March	638	42	13	5	60	70	22	8	9
April–June	1,287	21	20	6	47	45	42	13	4
July–September	1,683	25	28	4	57	44	49	7	3
October–December ...	734	86	21	7	114	76	18	6	16
Total, 1928	4,342	174	82	22	278	63	29	8	6
Total, 1927	3,790	175	62	29	266	66	23	11	7
Total, 1926	4,080	148	108	44	300	49	36	15	7
Total, 1925	4,152	157	104	45	306	51	34	15	7
April–December, 1924 ...	3,668	102	88	34	224	46	39	15	6

NOTES.—(1) Landings for fuel are not included.

(2) The flights shown in this table include special air transport flights in addition to scheduled services on the regular routes; these special flights are included in Table 5 for 1927 and 1928 only.

TABLE 7.

Imperial Airways, Ltd.

Traffic and Efficiency Statistics of the Cairo–Basrah Service, 27th December, 1926–31st December, 1928.

(A) Traffic.

Period.	Aircraft miles.	Passengers carried (by stages).	Horse Power Miles.	Passenger Miles.	Goods Ton Miles.	Passenger Ton Miles.	Total Ton Miles.	Average Load.
							-	lbs.
27th December 1926, to 31st December, 1927	104,297	1,116	132,978,675	267,640	15,968	26,883	42,851	920
1st January to 31st, December, 1928 ...	117,935	2,039	150,367,425	453,605	31,154	45,563	76,717	1,460

NOTES.—(1) The statistics in the above table relate to subsidised flights only, with the exception of the figures in the column headed "Passengers carried (by stages)"; the totals in this column include a few passengers carried on non-subsidised or special charter air transport flights.

(2) In addition in 1927, 18,246 miles were flown on delivery flights or special charters off the route; and in 1928, 6,975 miles were flown on non-subsidised flights along the route or on special charters.

(B) Efficiency (All scheduled stage flights).

Period.	Total Flights.						Scheduled flights. Percentage completed.		Flights Commenced Percentage completed.	
	Scheduled.	Cancelled.	Commenced.	Completed uninterrupted.	Completed after interruption.	Interrupted and not completed.	Without interruption.	With or without interruption.	Without interruption	With or without interruption.
							%	%	%	%
27th December, 1926, to 31st December 1927...	406	3	403	396	7	—*	98	99	98	100
1st January to 31st December 1928 ...	449	3	446	409	37	—	91	99	92	100

* A flight was interrupted owing to a forced landing on 29th December, 1927 ; although not completed within 1927 it was completed within the period allowed under the subsidy agreement and ranks as a flight " completed after interruption."

TABLE 8.

Accidents : British Commercial Aviation.

(Aircraft heavier than air).

——	Air transport.			Other flying for hire.		
	August, 1919 to December, 1921	1922 1923 1924	1925 1926 1927 1928	May, 1919 to December, 1921	1922 1923 1924	1925 1926 1927 1928
Aircraft mileage flown	973,000	2,596,000	3,482,000	1,035,000	372,000	842,000
No. of accidents involving casualties						
Fatal	3	3	No accidents resulting in death or injury.	7	—	1
Non-fatal, but resulting in injury to occupants	1	3		20	2	3
Approximate machine miles per accident resulting in death or injury to occupants	243,000	433,000		38,000	186,000	210,000
Machine flights per accident resulting in death or injury to occupants	1,078	2,208		3,002	28,807	42,315
Passengers killed	3	10	No accidents resulting in death or injury.	8	—	1
Passengers injured	4	1		11	1	1
Passenger flights per passenger killed	3,975	3,955		17,183	—	336,726
Passenger flights per passenger injured	2,981	39,546		12,497	104,237	336,726
Crew killed	4	5		7	—	—
Crew injured	1	4		20	2	4

NOTES.—(1) The numbers of crew carried are not available.

(2) For the period of May, 1919–December, 1921, other flying includes all flying other than air transport or competitive flying. For the period 1922–1928, other flying is flying for hire or reward other than air transport and competitive flying.

(3) For details of accidents during 1928 see pages 32–37.

(4) During 1927 and 1928, a total of 247,500 aircraft miles was flown without accident on the Cairo–Basrah service : this total is not included in the total of 3,482,000 shown above.

TABLE 9.

Subsidised Light Aeroplane Clubs.

Name of Club.‡	Particulars of membership as at 31st December, 1928.			Number of members qualified as Pilot. ("A" licence).		Number of members qualified as Pilot. ("B" licence).		Aircraft flights and hours flown during 1928.	
	Number of flying members.	Number of Associates.	Total membership.	Number who qualified during year.	Total number qualified at end of year.	Number who qualified during year.	Total number qualified at end of year.	Total flights.	Total hours.
London Aeroplane Club ...	277	135	412	30	85	1	5	4,563	1,744
Midland Aero Club	138	213	351	24	33	—	2	3,306	1,217
Newcastle-on-Tyne Aero Club	136	72	208	9	39	—	1	2,762	1,009
Yorkshire Aero Club ...	130	150	280	13	24	1	5	2,931	957
Lancashire Aero Club ...	187	106	293	19	44	—	3	3,600	1,001
Hampshire Aeroplane Club	235	165	400	26	59	—	4	4,442	1,566
Bristol and Wessex Aeroplane Club	118	89	207	11	25	—	10	2,248	798
Norfolk and Norwich Aero Club	123	223	346	18	27	—	2	2,211	812
Scottish Flying Club ...	181	187	368	25	44	2	6	2,590	1,082
Nottingham Aero Club ...	48	25	73	16	17	—	—	2,210	811
Suffolk and Eastern Counties Aeroplane Club	35	76	111	11	13	—	1	1,853	600
Cinque Ports Flying Club* ...	59	7	66	13	13	—	1	846	326
Liverpool and District Aero Club†	102	71	173	4	11	—	—	886	278
	1,769	1,519	3,288	219	434	4	40	34,448	12,201

* 8 months only.

† 4 months only.

‡ Clubs are given in order of seniority.

CHAPTER VI.

THE DOMINIONS, INDIA, AND COLONIES.

AUSTRALIA.

The total Civil Aviation Vote for 1928–29 was £100,000 as compared with £121,300 for 1927–28, both these sums being additional to the special grant from surplus funds in 1927–28 of £200,000, to be utilised as necessary in connection with the extensive scheme of expansion referred to in the last Report.

The subsidised services Perth–Derby (West Australian Airways), Charleville–Camooweal, with branch line Cloncurry–Normanton (Queensland and Northern Territory Aerial Services Ltd.), and Adelaide–Cootamundra, with branches Mildura–Broken Hill and Hay–Melbourne (Larkin Aircraft Supply Co., Ltd.) continued to operate with great success during 1928. In addition to the mail services operated by Q.A.N.T.A.S. the company operated an unsubsidised service between Brisbane and Toowoomba.

In connection with the new scheme mentioned above tenders were called for during 1928 in respect of the operation of the services Adelaide–Perth, Camooweal–Daily Waters and Charleville–Brisbane.

The contract for the service Adelaide–Perth via Ceduna, Cook, Rawlinna and Kalgoorlie, was let to West Australian Airways, Ltd., and a weekly service was put into operation over this route as from 29th May, 1929. The company will be paid 12*s*. 8*d*. per lb. for the carriage of mails and have been guaranteed a load of 600 lbs. each trip. When the weight of mails exceeds 800 lbs. on each trip over a period of four months the guaranteed load will be increased to 1,200 lbs. per trip. The government has prepared the necessary landing grounds and is providing in addition, night lighting equipment to a maximum value of £12,000, the contractor being required to operate and maintain the night lighting equipment at his own expense. The contract is for a term of 5 years and thereafter until expiration of 12 months notice from either side.

The contract for a weekly service Camooweal–Daily Waters was let to the Larkin Aircraft Supply Co. and the subsidy payable is to be 3*s*. 4½*d*. per mile for the whole period of the contract, which is for three years. It is hoped to put this service into operation during 1929.

The Charleville–Brisbane contract, which provides for a weekly service for a period of three years was let to the Queensland and Northern Territory Aerial Services, Ltd., and operations commenced on 17th April, 1929. The subsidy payable is to be 3*s*. 3*d*. per mile for the first year, 3*s*. 1*d*. for the second year, and 2*s*. 11*d*. for the third year.

A new company, the Australian National Airways, Ltd., has been formed and propose operating between Melbourne–Sydney–Newcastle–Lismore and Brisbane, and another company is in course of formation to operate services from New Zealand and Tasmania to the mainland.

A flying ambulance and doctor service for the Australian Inland Mission using machines and personnel of the Q.A.N.T.A.S., Ltd., commenced to operate in May, 1928.

Activities are carried on at six light aeroplane centres, viz. :—

Sydney, Melbourne, Adelaide, Goldburn, Perth and Brisbane, and during 1928, 124 pupils obtained licences. The training operations at Brisbane which until now have been carried on by Queensland and Northern Territory Aerial Services, Ltd., are being handed over to the Queensland section of the Aero Club.

At 31st December, 1928, there were in Australia—

178 Private pilots.
103 Commercial pilots.
182 Ground engineers.
122 Aircraft.
171 Aerodromes.

These figures do not include licences and certificates temporarily invalid awaiting applications for renewal.

In New Guinea, four companies are now operating services from Lae to the Bulolo Goldfields.

STATISTICS OF AUSTRALIAN REGULAR AIR SERVICES.

Service.		Miles flown.	Passengers carried (by stages)	Goods carried. lbs.	Letters carried.
Perth–Derby	1928	153,501	957	63,310	*260,323
	1927	190,110	1,055	55,960	†258,091
Charleville–Camooweal ...	1928	119,996	1,106	65,253	*39,952
Cloncurry–Normanton ...	1927	105,960	1,049	34,092	†32,086
Adelaide–Cootamundra ...	1928	148,397	1,014	639	*17,108
Broken Hill–Mildura ...	1927	157,510	1,283	458	†11,149
Melbourne–Hay					
Totals	1928	421,894	3,077	129,202	*317,383
	1927	453,580	3,387	90,510	†301,326
Grand totals, all services, from Dec., 1921, to 31st Dec., 1928		2,220,894	15,049	334,717	‡1,566,177

* Year ended 30th November, 1928. † Year ended 30th November, 1927.
‡ Up to 30th November, 1928.

CANADA.

The total Civil Aviation Vote for 1928–29 was $3,345,037 (£684,197) including $93,700 (£19,165) for route development, as compared with a total of $2,332,275 (£479,892), including $66,835 (£13,752) for route development for the year 1927–28.

During 1928 the Post Office Department continued to develop its scheme for a system of air mail services which, it is hoped, will eventually cover all parts of the Dominion.

The special Winter air mail services, Leamington–Pelee Islands, Murray Bay–Seven Islands, Murray Bay–Anticosti and Moncton–Magdalen Islands referred to in the last Report, together with an additional service Moncton–Charlottetown opened by Canadian Transcontinental Airways, Ltd., on 19th February, 1928, all ceased to operate during April, 1928. The following contracts for winter air mail services to be operated during the period when ice renders navigation of the St. Lawrence impossible were granted in respect of the winter, 1928–29 :—

(1) Seven Islands–Anticosti (120 miles)—Canadian Transcontinental Airways, Ltd. Two trips per month.

(2) Leamington–Pelee Islands (22 miles)—London Air Transport, Ltd. Daily except Sundays.

(3) Moncton–Magdalen Islands (200 miles)—Fairchild Aviaton, Ltd. Weekly.

(4) Quebec–Seven Islands (350 miles)—Canadian Transcontinental Airways, Ltd. Two trips per week.

In addition to the above the following regular air mail services were operated under Post Office contracts :—

(1) Rimouski–Montreal (320 miles)—Canadian Transcontinental Airways, Ltd. Two return trips per week during the 30-week season of navigation on the St. Lawrence. Operated in connection with the incoming and out-going trans-Atlantic steamships, the saving of time varying from 24 to 96 hours.

(2) Montreal–Ottawa (110 miles)—Canadian Transcontinental Airways, Ltd. Operated weekly in connection with certain of the trips between Rimouski and Montreal.

(3) Montreal–Toronto (320 miles). Original contract for 2 trips per week commencing 5th May, 1928, granted to Canadian Airways, Ltd. Taken over by Fairchild Aviation, Ltd., on 1st October, 1928, under new contract providing for service daily except Sundays.

(4) Montreal–Albany (–New York) (200 miles)—Canadian Colonial Airways, Ltd. (subsidiary of Colonial Airways Inc. of U.S.A.). Daily service, commenced 1st October, 1928.

(5) Kississing–The Pas. (100 miles)—Western Canada Airways, Ltd. Weekly service commenced Spring, 1928. Serves the newly developed Cold Lake mining district.

(6) Lac du Bonnet–Bissett–Wadhope (82 miles)—Western Canada Airways, Ltd. Twice weekly service commenced 14th May, 1928. Serves the mining district in South-Eastern Manitoba.

(7) Sioux Lookout–Gold Pines, Red Lake–Narrow Lake–Jackson Manion—circular route totalling about 320 miles, serving the Red Lake mining district in Northern Manitoba—Western Canada Airways, Ltd. Weekly.

An experimental air mail service Winnipeg–Regina–Calgary–Banff with a branch line Regina–Saskatoon–Edmonton was operated by Western Canada Airways, Ltd., under contract with the Post Office between 10th and 29th December, 1928. The experiment was very successful, and it is hoped to establish regular services between these points during 1929. Another experimental air mail service, Ottawa–Montreal–St. John–Halifax has been operated by the Civil Air Operations Branch of the Ministry of National Defence for a period of seven weeks commencing in January, 1929. With a view to extending existing services surveys of routes between Ottawa and Winnipeg and between Toronto and Sudbury have already been undertaken, while schemes for air mail services Toronto–Buffalo, Toronto–Windsor–Detroit, Ottawa–Vancouver and Montreal–Winnipeg are also under consideration.

A special 5 cent air mail stamp was issued by the Post Office on 1st October, 1928, to be used on letters weighing up to 1 oz. the charge for each additional ounce being 10 cents. The total amount of mail carried on the contract routes between their inception in December, 1927, and the 31st December, 1928, was 283,163 lbs.

A large amount of flying, including exploration, forest survey, aerial photography, fire detection and suppression, and transport of men and supplies to remote districts, was carried out during 1928 by commercial concerns such as the Fairchild Aviation, Ltd., under contract with the governments of Quebec and British Columbia. Apart from government contract work, operations by the various companies during 1928 included the following :—

Western Canada Airways, Ltd. Passenger and freight services Seattle–Vancouver–Victoria and in several directions

from Hudson and Pine Ridge, fisheries patrol in British Columbia and flying training school. The Post Office has granted permission for mails to be carried by a weekly passenger and freight service Waterways–Fort Chipwyan–Fort Smith (850 miles) opened by this company on 11th January, 1929.

Fairchild Aviation, Ltd. Passenger and freight service Oskelaneo River–Chibougamou.

General Airways, Ltd. Passenger and freight services from Amos (Quebec) to Noranda, Rouyn and Haileybury (Ontario).

British Columbia Airways, Ltd. Passenger and freight service Vancouver–Victoria–Seattle.

Pickering Royal Air Mail Line. Passenger and freight service White Horse–Dawson (Yukon Territory). Mails also are carried by arrangement with the Post Office.

Yukon Airways and Exploration, Ltd. Miscellaneous operations in the Yukon Territory.

Northern Aerial Minerals Exploration, Ltd. Exploration and prospecting.

Interprovincial Airways, Ltd. Passenger and freight service Montreal–Fort Erie.

Sky View Lines, Ltd. Sight-seeing service over Niagara Falls.

Sixteen light aeroplane clubs have now been approved under the scheme for government assistance referred to in the last Report. Fifteen of these, *i.e.*, those at Victoria, Regina, Calgary, Edmonton, Saskatoon, Winnipeg, London, Hamilton, Ottawa, Toronto, Walkerville (Border Cities), Granby, Montreal, Halifax, and Moose Jaw, are already in active operation, while that at Vancouver will commence flying activities shortly. These clubs have a total membership of 2,400. During 1928, 8,124 hours were flown and 111 Private licences and 28 Commercial licences were obtained by members. Provision has already been made for the assistance of a further eight clubs.

The following statistics, which indicate a very great increase in flying during 1928, as compared with 1927, include, in addition to those of civil operators, and light aeroplane clubs, statistics of the operations carried out by the Ontario Government air service which now owns a fleet of 25 aircraft, and carries out miscellaneous work including forest fire detection and suppression, forest survey and inventory and transportation in remote districts.

	1927.	1928.
Aircraft flights	16,748	75,285
Aircraft mileage	829,010	2,728,414
Number of passengers carried	18,932	74,669

	1927.	1928.
Freight or express carried (lbs.)	1,098,348	2,404,682
Mail carried (lbs.)	14,684	316,631
Number of square miles covered by vertical photography	9,284	14,991
Number of square miles covered by oblique photography	21,960	8,831
Total number of square miles covered by aerial photography	31,244	23,822

In addition to the above, aerial photography for topographical surveys was carried out by the Directorate of Civil Government Operations, Department of National Defence. During 1928, 65,200 square miles, of which 31,400 square miles were vertical and 33,800 square miles oblique photography, were photographed, as compared with an area of approximately 46,000 square miles of topographical survey carried out by the Royal Canadian Air Force during 1927.

IRISH FREE STATE.

The Irish Aero Club, Ltd., was formed towards the end of 1928 for the furtherance of civil aviation and the establishment of flying clubs. A company entitled Irish Airways, Ltd., was also formed about the same time and has since put forward proposals for the operation of a service from Dublin to London.

SOUTH AFRICA.

The scheme for the formation of a company to be known as African Airways, Ltd., to operate a service between Durban and Johannesburg with the assistance of the subsidy of £8,000 per annum offered by the government was abandoned owing to failure to raise the necessary capital.

A company entitled Union Airways, Ltd., has since, however, been formed, and has obtained a government contract for the operation of a service Cape Town–Port Elizabeth, with extensions to East London and Durban, and to Bloemfontein and Johannesburg. This contract will be in force for three years and will carry the government subsidy of £8,000 per annum.

Although no Government assistance is granted to light aeroplane clubs five such clubs at Cape Town, Durban, East London, Johannesburg, and Port Elizabeth, were in active operation during the year. Additional clubs are in course of formation at Bloemfontein and Witbank.

New companies entitled Aeros Proprietary, Ltd., African Aerial Travels, The Aircraft Company, and Devices, Ltd., were formed during the year, all these concerns operating light aeroplanes.

NEW ZEALAND.

Standard regulations are being drawn up for the assistance of Light Aeroplane Clubs, some 23 of which have been formed. The government are already giving assistance to three clubs, viz., Christchurch, Auckland and Blenheim, and it is their policy to get these three firmly established and then to consider applications from other clubs on their merits.

A new company, New Zealand Airways, Ltd., has been formed at Dunedin to engage in general air transport business.

INDIA.

The Finance Committee of the Indian Legislative Assembly approved the proposal of the government to ask for tenders for the running of a regular weekly subsidised air service between Karachi and Rangoon, to be operated in three sections, Karachi–Delhi, Delhi–Calcutta, and Calcutta–Rangoon. Since the close of the year under review a company, Indian Airways, Ltd., has been formed, and has tendered for the operation of the Karachi–Delhi and Delhi–Calcutta sections.

With a view to encouraging the employment of Indians in Indian civil aviation, the Government are granting 10 scholarships, spread over a period of four years, to selected Indians in order that they may receive the necessary training in England.

The light aeroplane clubs in India are under the control of the Aero Club of India and Burma, which in 1928 received a Government subsidy of Rs.30,000. Clubs have been formed at Karachi, Delhi, Bombay and Calcutta, and are all in receipt of government assistance.

THE COLONIES.

East Africa.

Following on a recommendation made at the Colonial Office Conference in 1927, an Air Ministry representative carried out during the year under review an investigation of the conditions and prospects for civil aviation in Kenya, Uganda and Tanganyika. This investigation extended to the Egypt–East Africa section of the proposed route to South Africa.

The series of experimental flights on the route from Khartoum to Kisumu commenced by the North Sea Aerial & General Transport, Ltd., was completed by flights made by Sir Alan Cobham on the Short Singapore with which he made his

round-Africa flight. The African interests of the North Sea Aerial & General Transport, Ltd., and Alan Cobham Airlines, Ltd., were amalgamated during this period and, as stated elsewhere, since the close of 1928 an agreement has been made between this group and Imperial Airways, Ltd., for the formation of a new company for the further development of the main African route to Cape Town. The negotiations for the establishment of this through air service have been carried to a further stage by representatives of this new combine.

The development of private flying in Kenya proceeded slowly during the year, the number of privately-owned machines increasing to five. The Aero Club of Kenya, having achieved a membership of nearly 300, was reconstituted as the Aero Club of East Africa in order to extend its activities to Uganda and Tanganyika. Progress was made in the establishment of landing grounds for aircraft and in general preparations for the further development of aviation in these territories.

West Indies.

The proposals made by the British Guiana Air Transport Co., Ltd., for the development of air transport in this region, which were referred to in the last report, failed to materialise owing to lack of capital. Further proposals by a new company entitled Atlantic Airways, Ltd., are now under consideration.

CHAPTER VII.

FOREIGN COUNTRIES.

AUSTRIA.

The civil aviation subsidy voted for 1928 was 2,000,000 schillings (£57,600), as compared with 1,000,000 schillings for 1927.

The Oesterreichische Luftverkehrsgesellschaft operated the following services during 1928 :—

(1) Vienna–Salsburg–Innsbruck–Constance (period 21st May, 1928 to 15th September, 1928).

(2) Salsburg–Klagenfurt.

(3) Vienna–Prague–Dresden–Berlin (in conjunction with " Deutsche Lufthansa ").

(4) Berlin–Vienna (express service (in conjunction with " Deutsche Lufthansa ").

(5) Vienna–Graz–Klagenfurt–Venice (in conjunction with the Italian " Societa Transadriatica ").

(6) Klagenfurt–Graz–Budapest (in conjunction with " Ungarische Luftverkehrs A.G.).

BELGIUM.

The total Belgian civil aviation vote for 1928 was 21,388,360 frs. (£122,300), as compared with 11,600,047 frs. (£66,400) in 1927. The amounts voted as subsidy to the S.A.B.E.N.A. in these years were 6,300,000 frs. (£36,000) and 3,850,000 frs. (£22,000) respectively.

The S.A.B.E.N.A. again operated the Brussels–Ostend–London route, the service being maintained throughout the year. An extension to Cologne was put into operation on 23rd April and a branch line from Brussels to Antwerp was opened on 14th May.

In the Belgian Congo the S.A.B.E.N.A. continued to operate the Boma–Elizabethville service and the branch line Luebo–Tsikapa, while additional branch lines Leopoldville–Bandundu–Inongo–Coquilhatville and Luebo–Lusambo were opened on 22nd May and 17th April respectively. Additional internal services Bukamo–Stanleyville, Lusambo–Kabalo–Albertville, Coquilhatville–Uléle, Boma–St. Paul de Loanda (Portuguese Angola) and Coquilhatville to the neighbourhood of Lake Albert are under consideration.

The interministerial committee was set up to consider the question of an air line to the Belgian Congo, and as a result of subsequent negotiations between the Belgian and French governments a decision has been reached to operate a joint weekly service from 1930, Belgian and French companies operating alternatively over a route extending through the Belgian Congo to Beira with a French extension to Madagascar

The agreement between the S.A.B.E.N.A. and the government details of which appeared in the last Report took effect during 1928, thus ensuring financial support for the company until the end of 1932. The capital of the company was increased to 10,000,000 frs. (£57,200) the State and Belgian Congo government together holding half. The dividend bearing shares were increased to 32,000 of which the State and Colony hold 21,000, thus giving them a majority vote at the general meetings of the shareholders.

DENMARK.

The government subsidy of 250,000 Kr. (£13,750), plus 100,000 Kr. (£5,500) from the Copenhagen Muncipality was again granted as in the three previous years. Arrangements for 1929–30 onwards are still under consideration.

The Danske Luftfartselskab confined itself to the operation of a Copenhagen–Hamburg service, and a Sunday newspaper service from Copenhagen to Aarhus.

FRANCE.

The total civil aviation vote for 1928 amounted to 217,674,140 frs. (£1,755,400), as compared with 169,211,240 frs. (£1,364,600) for 1927 the sums set aside for direct subsidies to air transport companies for the respective years being 115,000,000 frs. (£927,200) and 78,650,000 frs. (£634,300). The increase of subsidy for 1928 was largely due to the allocation for the France–South America service of 38,000,000 frs. (£306,400), as compared with 6,250,000 frs. (£50,400) in the previous year. A total sum of 1,110,000 frs. (£8,950) was offered to aircraft and engine constructors who succeeded in establishing and holding world's records during 1928, representing an increase of 250,000 frs. over the 1927 figure.

The outstanding feature during the year under review was the creation of an Air Ministry under the direction of M. Eynac, the former Under Secretary of State for Aeronautics and Aerial Transport. In this Ministry are co-ordinated the functions of the Military, Naval, Colonial and Commercial air services, the Fleet Air Arm alone being unaffected.

The services operated by the various companies during 1928 were as follows :—

Air Union. Paris–London, Paris–Marseilles with branch line Lyons–Geneva (daily services) and a bi-weekly service Antibes–Ajaccio–Tunis, Bone being included in the outward journey.

Société Générale de Transports Aériens (Farman). Daily services Paris–Cologne–Essen–Berlin and Paris–Brussels–Rotterdam–Amsterdam. Permission having been obtained for flight over the Saar territory, a few flights were carried out over the route Paris–Saarbruck–Frankfurt in conjunction with the Deutsche Lufthansa with an extension to Berlin. During 1929 a regular service is scheduled on this route and a service Paris–Cologne–Dusseldorf–Hamburg–Copenhagen–Malmo, also operated in conjunction with the Lufthansa, is proposed.

Compagnie Internationale de Navigation Aérienne. A daily service Paris–Strasbourg–Nuremburg–Prague–Vienna–Budapest–Belgrade–Bucharest–Constantinople. From Prague a branch line was operated to Warsaw while from Belgrade an additional service to Constantinople via Sofia was operated three times weekly. A bi-weekly extension from Constantinople to Baghdad via Aleppo is proposed for 1929.

Cie Générale Aéropostale. A daily combined passenger, mail and freight service Toulouse–Perpignan–Barcelona (if required)–Alicante–Malaga (if required)–Tangier–Rabat–Casablanca with a weekly extension for goods and mails to Agadir–Cap Juby–Villa Cisneros–Port Etienne–Dakar, and a branch, operated daily, from Perpignan to Marseilles. The branches Alicante–Oran and Casablanca–Rabat–Fez–Oran were not operated. From 1st March, 1928, the company extended its main route to South America by means of a weekly combined air and maritime mail service from St. Louis, near Dakar, to Buenos Aires. Pending the development of a suitable type of flying-boat the section St. Louis–Cape Verde Islands–Fernando Noronha–Natal is being operated by fast steamers, aircraft completing the journey via Pernambuco–Bahia–Victoria–Rio de Janeiro and Florianopolis. The average time taken on the service is 9–10 days compared with about 18 days by steamer. In consequence of the difficulties experienced by French airmen who have been forced to land in Morocco, the company is considering the question of diverting its route from the coastline of N.W. Africa and flying by way of the Sahara instead. The subsidiary company " Compania Argentina Aeropostal " operated an extension of the service from Buenos Aires to Asuncion (Paraguay). Further extensions are contemplated, namely Buenos Aires–Santiago (Chile), Buenos Aires – Comodoro Rivadavia – Punta Arenas, Buenos Aires – Copiapo, Santiago–Valparaiso–Copiapo–Arica and Natal–Belem–

Macapa–French Guiana–West Indies. A weekly service Paris–Bordeaux–Biarritz, to be extended later to Madrid, was opened in July.

Cie France–Algerie. (Subsidiary of Cie Générale Aéropostale). A service Marseilles–Algiers, opened in August was only operated irregularly. The technical control of this service is in the hands of Cie Générale Aéropostale.

Air Union Lignes d'Orient. As reported below, this company and the Air Union are to combine to form a new company to operate the Marseilles–Syria service. Trial flights over the route Marseilles–Bastia–Naples–Corfu–Athens–Castellorizo–Beyrut have been carried out, and agreement has already been reached with the Italian government regarding this service.

Compagnie Aerienne Francaise. This company commenced during the summer a weekly service between Paris and Cherbourg, to connect at the latter place with the arrival of the trans-Atlantic liners, and a weekly service between Marseilles and Nice. In November a taxi service from Calais to Dover was also put into operation.

An interesting development was the formation by the French railways system of a company entitled " Societe Anonyme pour le Developpement de l'Aviation Commerciale Francaise " with the object of developing combined rail and air services. This company proposes to inaugurate a service for the carriage of mails between Bordeaux, Lyons and Geneva, the first portion of the route, from Bordeaux to Montlucon being served by train until such time as night-flying becomes possible. Experimental flights have already been carried out with a machine hired from the Compagnie Aerienne Francaise.

The shipping companies also are beginning to study the possibilities of air transport. During the summer the steamship " Ile de France " of the Compagnie Générale Trans-atlantique, plying between Cherbourg and New York, was equipped with catapult gear for launching aircraft at sea. An amphibian machine, with quantities of mails, was launched successfully on four occasions and on three of these the flights of some 400 or 500 miles to the port of destination were completed without incident, effecting a saving of approximately 24 hours in the arrival of the mails. It is intended to renew the experiments during 1929.

Negotiations between the French and Belgian authorities with a view to collaboration in the operation of a service between France and Madagascar via the Sahara and Belgian Congo have resulted in an agreement to commence joint operation in 1930 of a weekly service, French and Belgian companies operating alternately as far as Beira in Portuguese East Africa. A French seaplane service will complete the journey to Madagascar. In

connection with this proposal a new company entitled " Air Afrique " was formed during 1928 with a capital of 40,000,000 frs., while preliminary investigations have been carried out by the Cie Générale Aéropostale.

The Air Minister has decided on a complete re-organisation of French civil aviation, involving the merging of the existing companies in accordance with the following geographical grouping of the existing and proposed routes :—

(1) Continental system, Paris to the European capitals, involving a merging of the Compagnie Internationale de la Navigation Aérienne and the Societé Générale de Transport Aérienne.

(2) Eastward system, France to Indo China, involving a merging of the Air Union and Air Union Lignes d'Orient.

(3) Westward system, France to Algeria, Africa and South America, involving, presumably, a merging of the Cie Générale Aéropostale, Air Afrique and possibly other concerns.

The necessary negotiations are proceeding satisfactorily. An interesting clause will probably appear in the agreements between the new combined companies and the government, permitting, for the first time, the use of a substantial percentage of aircraft of foreign construction on the French air lines.

In addition to the merging of the air transport companies, the Air Minister is also encouraging the grouping of aircraft manufacturers in order to prevent some of the weaker firms being forced out of existence, and several amalgamations have already taken place.

GERMANY.

The Reich civil aviation vote for the financial year 1928–29 amounted to R. Mks. 52,734,395 (£2,585,020) and of this a sum of R. Mks. 20,165,000 (£988,480) was allocated as direct air transport subsidy, as compared with R. Mks. 46,118,500 and 22,065,000 respectively for the year 1927–28. The Reich vote, as in former years, was supplemented by the States and municipalities. For 1928 the sums granted by the States totalled R. Mks. 5,900,000 (£289,220), while the contributions of the various municipal authorities are reported to have exceeded R. Mks. 3,500,000 (£171,570).

The extensive network of internal and international German air services was further developed during 1928, a total of approximately 90 services as shown on the accompanying maps being operated by the Deutsche Lufthansa during the summer months. Of these some 30 continued operation after the close of the summer season, and about 14 routes remained in action throughout the winter.

The year was notable for the establishment of non-stop express services from Berlin to Paris and Zurich, an express service Berlin–Vienna–Venice–Rome, operated in conjunction with Austrian and Italian companies, and special freight services from Berlin to London and Paris with intermediate feeders from the industrial districts of the Ruhr and Rhineland, these services proving a complete success. The establishment of the Berlin–Madrid service, referred to in the last report, was completed in January, 1928, and the journey between the German and Spanish capitals is now carried out in two days. The " Balair " company co-operates on the Swiss section of the route, while the Barcelona–Madrid portion is operated by the Spanish company " Iberia." An experimental service was operated between Bremerhafen and Berlin during the summer to connect with the North German Lloyd's liner " Columbus " at Bremerhafen and convey passengers to Berlin. This shipping company, together with Lufthansa, also carried out experiments with a German device for launching seaplanes from its steamer " Roland." After certain improvements have been effected to the apparatus further trials are to be carried out.

Two routes, Berlin–Konigsberg and Berlin–Hanover are now equipped for night flying. Forty-six lights, at an average distance apart of 5–6 kms., have been installed between Berlin and Hanover, and the route has been divided into three sections, red lights being employed on the first section, white on the second, and red again on the third. A pilot is thus given a good clue to his exact position. Further routes are to be lighted during 1929. The erection of route marking lights is carried out by the " Signaldienst fur Luftverkehr Zeichen G.m.b.H., a company which was formed with the co-operation of Lufthansa and is under the control of the Reich Ministry of Communications, which supplies the material necessary for the installations.

The establishment of two long-distance services of international importance is being studied by the Lufthansa. The first is to be an extension of the existing Berlin–Seville route to South America via Spain, North Africa, Canary Islands–Cape Verde Islands–Fernando de Noronna–Brazil there linking up with the services of the Lufthansa's subsidiary, the Condor Syndicate. Trial flights have already been carried out from Cadiz to the Canary Islands, and the company is now awaiting the production of a flying boat possessing suitable range and reliability characteristics to operate the cross-Atlantic portion of the route. The second proposed service is from Berlin across Russia to Pekin, and is at present the subject of negotiations with the Soviet and Chinese governments. Two trial flights from Berlin to Irkutsk on Lake Baikal (about four-fifths of the total distance to Pekin) were successfully carried out in the autumn of 1928.

An insurance company entitled "Deutsche Luft Versicherungs A.G." was formed during the year. This company, whose share capital is all held by Lufthansa will not for the time being undertake air insurance itself, but will act as intermediary for the numerous insurance transactions of the Lufthansa, and will investigate the prospects of that company carrying out its own insurance in the future.

The agreement between Lufthansa and the railway companies for combined air and rail transport, referred to in the last report, has been extended to cover passenger and luggage traffic.

The output of trained and certificated pilots during the year was approximately 400, while it is claimed that 500 pupils received training in gliding flight at the two schools of the Rhon-Rossiten Gesellschaft.

The membership of the Deutsche Luftfahrt Verband (D.L.V.) had increased to about 30,000 at the end of the year.

An international exhibition of civil aircraft (I.L.A.) was held in Berlin from 7th to 28th October and proved a great success. Twenty-two nations including Great Britain participated, and the visitors numbered approximately half-a-million.

HOLLAND.

A sum of Fl. 600,000 (£49,600) was allocated as subsidy to the Koninklijke Luchtvaart Maatschappij voor Nederland en Koloniën (K.L.M.) for 1928.

The main features of Netherlands civil aviation development during the year were the inauguration of a series of experimental mail flights to the Netherlands East Indies, and the opening of regular air transport services in that colony.

The following services, which, with the exception of the last-mentioned, were the same as those operated during 1927, were operated by the K.L.M. during 1928 :—

Amsterdam–London.

Amsterdam–Paris.

Amsterdam–Rotterdam.

Amsterdam–Hamburg–Copenhagen–Malmo (in conjunction with Swedish company "A/B Aerotransport ").

Amsterdam–Bremen–Hamburg (in conjunction with " Deutsche Lufthansa ").

Amsterdam–Brussels–Basle (in conjunction with Swiss " Balair ").

Lympne–Ostend (early morning newspaper service operated during July and August).

The first of a series of twelve return experimental mail flights to the Netherlands East Indies was commenced on 11th October, 1928, and was successfully completed on 15th November. A second flight was carried out during December, 1928, and January, 1929. Further flights have been postponed until September, 1929.

In order to acquire the necessary material to carry out these flights the K.L.M. found it necessary to increase its capital, and the Netherlands government accordingly decided to take up the remainder of its shares in the company (400 of Fl. 1,000 each) during 1928 and 1929, instead of during the years 1929–31 as required by the subsidy contract of 1927. A Bill was introduced to increase the 1928 Budget by Fl. 200,000 in order to provide for taking up half the remaining shares while provision will be made in the 1929 Budget for taking up the balance of 200.

A sister company of the K.L.M. entitled " Koninklijke Nederlandsch Indisch Luchtvaart Maatschappij (K.N.I.L.M.) has been founded in the Netherlands East Indies with a capital of Fl. 500,000 (£41,322), and a contract concluded with the Colonial government for the establishment of regular mail and passenger services on the routes Batavia–Semarang–Sourabaya, Batavia–Bandoeng and Batavia–Singapore–Belawan Deli (Medan). Under the terms of this contract the first two services were to be opened on 3rd September, 1928, and the third on 1st January, 1929. In return for the operation of these services the company is to receive a subsidy of Fl. 300,000 (£24,793) for the period 1st September–31st December, 1928, and for each year until the expiration of the contract on 31st December, 1933, a sum of Fl. 1,000,000 (£82,645). The machines for the operation of these services, four Fokker F.VII's, each fitted with three Armstrong-Siddeley " Lynx " engines were flown out from Amsterdam during September and October by the K.L.M., which is to have the technical control of the services. The first two flights were completed according to schedule, but the third and fourth machines met with mishaps at Cawnpore and Rangoon respectively, and had to be shipped to the Netherlands East Indies. The delay in the arrival of the machines at Batavia necessitated postponing the opening of the services to Bandoeng and Sourabaya until November, and at the last moment it was discovered that no suitable landing ground existed at Sourabaya so that the proposed Batavia–Sourabaya route is at present operated as far as Semerang only.

An international light aeroplane meeting was held at Rotterdam in July in which British entrants successfully competed.

HUNGARY.

Operation of the routes Budapest–Vienna and Budapest–Graz was continued during 1928 by the " Ungarische Luftverkehrs A.G." Towards the end of the year the name of the company

was altered to "Ungarische Flugverkehrs A.G." and the majority of the shares were acquired by the Mannfred Weiss Works of Budapest, one of the largest industrial undertakings in Hungary. It is proposed to develop the company on a large scale and to organise an extensive system of air lines connecting the principal Hungarian cities.

ITALY.

The Vote for Civil Aviation 1928–29 was Lire 49,630,000 (£535,556) of which Lire 48,300,000 (£521,204) was for subsidies.

The following services were operated during 1928 :—

Societa Anonima Aero Espresso Italiana. Brindisi–Athens–Constantinople.

Societa Anonima Navigazione Aerea. Genoa–Rome–Naples–Palermo; Rome–Majorca–Barcelona–Genoa–Rome, (1,376 miles) inaugurated on 15th November, 1928, following the conclusion of an agreement with Spain and Rome–Syracuse–Tripoli, (1,442 miles, opened on the same date. There is a possibility that the latter service may be extended to Tobruk.

The period of the convention with the government for the operation of these two services is 10 years and the service is weekly on both lines. The State will pay a subsidy of Lire 30 for each effective km. flown up to a total of 400,000 kms. (248,550 miles) this subsidy being liable to subsequent revision. In addition, for the carriage of postal matter—over 3 kgs. of private and official matter which is carried free—the company will be paid, subject to certain conditions, Lire 25 for each kg. from Italy to Spain and Lire 15 for each kg. carried from Italian ports to Tripoli.

Societa Italiana Servizi Aerei. Turin–Trieste, Trieste–Zara. On 15th December, 1928, the latter route was altered to Trieste–Zara–Ancona–Venice–Trieste.

Societa Anonima Avio Linee Italiane (formed during 1928). Milan–Trento–Munich. Opened on 13th May, 1928, following the conclusion of an air traffic agreement with Germany and extended to Rome on 29th October, 1928.

Societa Aerea Mediterranea (formed during 1928). Rome–Cagliari, Brindisi—Valona, opened on 21st April, 1928, in addition to the Albanian services Tirana–Scutari; Tirana–Koritza; Tirana–Valona.

Societa Transadriatica. Rome–Venice–Vienna; Venice–Ancona–Bari–Brindisi. The latter service was opened 21st April, 1928.

NORWAY.

The Civil Aviation Vote for 1928–29 was 37,000 kr. (£2,035 approx.) of which a sum of 10,000 kr. (£550 approx.) was allocated as a subsidy to Luftruter A/S. The Municipality of Oslo have also voted to Luftruter A/S a subvention of 10,000 kr. (£550 approx.).

The Luftruter A/S commenced operations during 1928, and were responsible for providing a service over the Oslo–Gothenberg–Copenhagen–Warnemunde section of the Oslo–Berlin route. A similar service is contemplated for 1929, when the company also proposes to operate a route Oslo–Stavanger, while further services, Oslo–Trondhjem and Trondhjem–Tromso are under consideration for operation during 1930.

Neither the Norske Luftruteselskap nor the Norske Flyveselskap, a new company formed during the year, operated any services during 1928.

SOVIET RUSSIA AND PERSIA.

The German-Russian company "Deruluft" continued during 1928 its operation of the service Moscow–Berlin via Smolensk, Riga and Konigsberg and opened, in addition, a new branch line from Riga to Reval and Leningrad.

The "Dobroliot," in addition to operating the services Tashkent–Duschambe, Charjui–Teschaus, Frunze–Alma Ata, Verkhny Udinsk–Ulan Bator and Tashkent–Kabul commenced during the Summer the operation of a thrice weekly experimental air mail service between Moscow and Irkutsk via Novosibirsk (2,790 miles), a section of the important proposed route between Moscow and the Far East. A regular service was opened in May, 1929, the complete journey from Moscow to Irkutsk being effected in 36 hours. The "Dobroliot" also opened during 1928 an important new service between Irkutsk and Yakutsk (1,856 miles) with a branch line to Vitim-Bodaibo, for the transport of passengers, furs and gold across an almost uninhabited region.

In addition to its activities in air transportation, the "Dobroliot" also engaged to a considerable extent in air survey, photography, and the dusting of insecticides over crops, and assisted in the location of fur bearing animals for the fur trade of the White Sea region.

The Ukraine Air Traffic Company (Ukrvosdukhput) maintained its regular passenger, goods and mail service between Moscow and Baku, via Orel, Kharkov, Rostov, Mineralni Vody and Vladikavkas, and continued to co-operate with the Junker's company in the operation of the extension from Baku to Pahlevi (Enzeli) in Persia. The Moscow–Baku route is being altered in 1929 to include Piatigorsk and Tiflis.

The Soviet government has recently formulated a 5-year plan for the development of air services throughout its territory, the proposals including the completion of the line from Moscow to Vladivostock, Pekin and Tokio, a service from Moscow to Tanshkent and Kabul and services from Archangel to lumber centres on the White Sea coast. By the end of 1933 the total length of air routes is expected to reach 26,500 miles.

The Persian branch of the German Junkers company, in addition to co-operating in the operation of the Baku–Pahlevi service mentioned above continued its operation of the services radiating from Teheran to Pahlevi, Meshed and Kasr-i-Shirin and opened a new service between Teheran and Bushire. The Kasr-i-Shirin service has since been extended to Baghdad by agreement with the Iraq government. The Teheran–Tabriz service was discontinued in 1928 as it had been found to be unprofitable.

SPAIN.

A Department of Civil Aviation and Air Transport was organised in 1928 under the Supreme Council for Aeronautics and civil aviation shows signs of considerable development.

The following services continued in operation during 1928 :—

Union Aérea Espanola. Madrid–Lisbon and Madrid–Seville.

Compania Iberia Aérea di Transportes S.A. Madrid–Barcelona, connecting with the German-Swiss Barcelona–Berlin service.

Compania Espanola di Trafico Aérea. Seville–Laraiche.

Two companies, the Union Aérea Espanola and a new company Aero Hispano, tendered in connection with the scheme for granting a 12-year concession for the operation of an extensive system of Spanish air lines which was referred to in the last Report, and in connection with which provision for the payment of a first annual subsidy of 3,000,000 pesetas (£33,300) was made in the 1928–29 vote. These two companies, which together represent a large group of aircraft manufacturers in addition to air transport interests, were amalgamated at the request of the government, and the concession was finally granted to a new corporation known as the Concesionaria de Lineas Aereas Subvencionada S.A., which was formed by these amalgamated companies, together with representatives of a number of banks, and of the remaining air traffic companies. The air traffic, aircraft manufacturing and financial groups thus represented will each participate in the capital of the new corporation to the extent of one third.

The " Iberia " company and the Compania Espanola di Trafico Aérea will continue to operate their services until the

expiration of the existing contracts, while the proposed Seville–Buenos Aires airship service, which is to be operated by the Sociedad Colon Transaerea Espanola is to be permanently excluded from the monopoly. The Spanish government has now agreed to subsidise the latter service, and agreement has also been reached between the company and the Argentine government for the carriage of mails over the route.

SWEDEN.

The air transport subsidy allocated for 1928 was 500,000 Kr. (£27,500), in addition to which a sum of 20,600 Kr. (£1,130) was voted for a weather reports service. The subsidy agreement between the A/B Aerotransport and the Swedish government terminated at the end of 1928, and a committee was appointed to go into the question as to whether continued government support will lead to development that will be in the State interest, and also to consider schemes to place air traffic on a self-supporting basis.

The A/B Aerotransport co-operated from April to October, 1928, in the following services :—

Malmo–Copenhagen–Hamburg–Amsterdam (in conjunction with K.L.M.).

Stockholm–Helsingfors (in conjunction with Finnish Aero O/Y).

Stockholm–Abo (in conjunction with Finnish Aero O/Y).

Between June and September, five experimental night air mail services between Stockholm and London were successfully carried out by the company at the instigation of the Royal Swedish Aero Club, the cost being borne by some banks and industrial concerns. The Malmo–Stockholm section of this route is to be equipped with air lights and emergency landing grounds, and it is hoped to establish a regular service in the near future.

The Swedish Aeronautical Union, which was responsible for the establishment of the civil flying school referred to in the last Report, is now working for the organisation of a flying ambulance service in Sweden for the transport of urgent cases from outlying districts to hospitals. Fifteen urgent surgical cases were transported from the Stockholm Archipelago to the city during the year. The Union is also considering the experimental operation of an air route to Norrland in 1929.

An International Flying Exhibition was held under the auspices of Royal Swedish Aero Club at Gothenburg in May, 1928.

SWITZERLAND.

Subsidies totalling frs. 265,000 (£10,500) were voted by the Federal Air Office for 1928, as compared with frs. 170,000 (£6,700) for 1927. In addition, subsidies were granted by local authorities, and the Post Office made grants for the carriage of mails.

The following services were operated by Swiss companies during 1928 :—

"*Ad Astra A.G.*"

Zurich–Stuttgart–Frankfurt (in conjunction with " Deutsche Lufthansa ").

Zurich–Berlin (in conjunction with " Deutsche Lufthansa ").

Zurich–Bienne–Lausanne (in conjunction with " Balair ").

Basle–Zurich–Munich (in conjunction with " Deutsche Lufthansa ").

" *Balair* " (*Basler Luftverkehr A.G.*).

Geneva–Zurich–Munich–Vienna (in conjunction with " Deutsche Lufthansa ").

Zurich–Basle–Brussels–Rotterdam–Amsterdam (in conjunction with " K.L.M.").

Geneva–Lausanne–Chaux de Fonds–Basle.

Basle–St. Gallen–Zurich.

Zurich–Geneva (operated as part of the Berlin–Madrid service).

" *Ostschweizerische Aero Genossenschaft* " (formed towards end of 1927).

St. Gallen–Geneva.

The system of combined air and rail transport of goods, referred to in the last Report, was put into regular operation from the opening of the summer season.

Sports and touring flying are rapidly developing in Switzerland, and several light aeroplane clubs have been formed.

An aeronautical mission which had been in Colombia for over four years was recalled towards the end of 1928, owing to differences arising between the mission and the Colombian government.

A provisional air agreement has been concluded with the authorities of the Saar Territory, and negotiations are proceeding for the conclusion of similar agreements with Austria, Spain and Italy.

OTHER EUROPEAN COUNTRIES.

The following outlines briefly the activities of the various air transport companies in the smaller European countries :—

Bulgaria.

The Bulgarian " Bounavad " company carried out a regular service over the route Sofia–Roustchouk–Varna. This company receives State assistance in the form of a " subsidy " of 10,000,000 levas (£15,000) spread over a period of 10 years, but this sum is eventually to be repaid to the government.

Czechoslovakia.

The Czech National Air Transport Co., in conjunction with German and Austrian companies, in March, 1928, opened a service Berlin–Prague–Vienna, and a service was also operated between Prague, Marienbad, Cassel and Rotterdam. The Czech State Air Lines operated in 1928 over the routes—Prague–Brunn–Bratislave–Kosice–Uzhorod and Prague–Marienbad.

Finland.

The Finnish company Aero O/Y operated the services Helsingfors–Stockholm and Abo–Mariehann–Stockholm in conjunction with the Swedish A/B Aerotransport in addition to the service Helsingfors–Talinn. The Estonian company "Aeronaut," which formerly co-operated on the latter route, went into liquidation early in 1928.

Iceland.

An aviation company was formed in Iceland with local capital, and received a small grant from the government. Employing Deutsche Lufthansa personnel and material, it operated postal and passenger services from Reykjavik to Akureyri and Vestmannöerne, and mail services to various places round the island. It is interesting to note that the journey from Reykjavik to Akureyri, which is normally done on horseback, taking nine or ten days, takes little more than two hours by air.

Poland.

The Polish " Aerolot " operated the services Danzig–Warsaw–Lemberg, Warsaw–Cracow, Warsaw–Lodz, Cracow–Lemberg, Cracow–Vienna and Cracow–Brno–Vienna. The Aero T.Z., Pozen, operated Warsaw–Pozen and Warsaw–Lodz–Pozen. From 1st January, 1929, however, owing to the government's decision to nationalise the civil air lines, these companies were taken over by " The Polish State and Local Government Air Line (' Lot ') ", which will operate the services Danzig–Warsaw–Lemberg, Warsaw–Katowice–Brno–Vienna, Katowice–Cracow, Warsaw–Pozen, Pozen–Bydgoszcz–Danzig, and Pozen–Katowice.

Portugal.

A National Air Council was formed in Portugal and the Servicos Aeros Portugueses co-operated with the Union Area Espanola in connection with the Madrid–Lisbon and Madrid–Seville services.

Roumania.

The Roumanian State Air Lines operated over the routes Bucharest–Cluz; Bucharest–Galatz–Kischineff and Bucharest–Jassy–Czernowitz.

Yugoslavia.

The Belgrade Air Navigation Co., as a result of an agreement with the government, commenced operations on 15th February, 1928, over the route Belgrade–Zagreb; passengers are carried in addition to mails. The company in the near future hope to run services between Belgrade and Skoplje; Belgrade and Sarajevo; Zagreb and Maribor.

UNITED STATES.

The amounts included in the Post Office and Department of Commerce votes for civil aviation for the years 1927–28 and 1928–29 were as follows :—

	1927–28. (*including supplementary appropriations*).	1928–29.
Post Office—		
Internal contract air mail services	$4,500,000 (£926,500)	$12,430,000 (£2,545,570)
Foreign contract air mail services	$150,000 (£30,880)	$2,050,000 (£419,820)
Department of commerce administration, organisation, etc.).	$3,956,500 (£814,600)	$5,575,400 (£1,141,590)

The rapid progress in the organisation and operation of contract air mail services has continued. Thirty-three contract routes were in operation at the end of 1928, with a total mileage of 14,155, while contracts for seven further services had been awarded. The number of companies engaged in the operation of non-contract air transport services also showed a considerable increase, with the result that by the end of the year most of the larger cities of the United States were linked by some form of air service, the total route mileage being approximately 20,000.

Added impetus to the steady growth of the volume of air mail was given on 1st August by the reduction of the air mail rate to 5 cents for the first ounce and 10 cents for each additional ounce, as the result of which air mail contractors are now handling approximately one-third more tonnage.

Considerable progress has been made in the lighting of air mail routes for night flying, and the provision of airports and landing grounds. By the early part of 1929 over 7,500 miles of airways had been lighted and over 400 Municipal airports and 300 Department of Commerce intermediate landing grounds had been established.

As the result of an act granting authority to the Postmaster-General to enter into contracts for the transportation of mail by air to foreign countries or insular possessions of the United States, which was signed on 8th March, 1928, contracts were let for the following services :—

(1) Key West–Cristobal (Canal Zone) via Havana (Cuba). (Pan American Airways). Opened 14th February, 1929. The Postmaster-General under the contract reserves the right to extend this service from the Canal Zone to Cartagena, Colombia; Maracaibo, Venezuela; Curaçao; Dutch West Indies; La Guaira, Venezuela; Port of Spain, Trinidad; Georgetown, British Guiana; and Paramaribo, Dutch Guiana. Plans are also under consideration for an extension down the West coast of South America to Valparaiso and across to Buenos Aires.

(2) Key West–San Juan (Porto Rico) via Havana (Cuba). (Pan American Airways). Opened 9th January, 1929. (The Postmaster-General reserves the right to extend this service by way of Leeward and Windward Islands to Port of Spain, Trinidad.

(3) Miami–Nassau (Pan American Airways). Opened 9th November, 1928.

(4) Brownsville–Mexico City (Pan American Airways). Opened 9th March, 1929.

(5) New York–Montreal (Colonial Air Transport). Opened 1st October, 1928.

In addition to Pan American Airways, another company, the Tri-Motor Safety Airways Inc. of New York, is actively engaged in connection with a proposal for an air line linking the United States with South America. This company proposes to operate over a route between New York and Buenos Aires via the Caribbean Islands, the Northern coast of South America and the east coasts of Brazil and the Argentine. In addition this company contemplate a feeder route from Port of Spain, Trinidad, to Venezuela.

A company known as the Transcontinental Air Transport Inc. has been formed with the object of organising combined air and rail passenger services across the United States and is actively engaged on the organisation of such a service from New York to Los Angeles and San Francisco.

Curtiss Flying Services Inc., an important new company financed by the Curtiss Aeroplane and Motor Co., and a group of financial interests, was formed during the year with the object of establishing an air-taxi and flying school service covering the whole of the United States and providing commercial aviation facilities of every description. The company has already established completely equipped stations at 29 cities.

Important developments commenced to take place during the year in connection with the financial aspect of aviation, and there has been a general movement among the companies towards groupings and amalgamations of various kinds. Several aeronautical finance corporations have been formed, either for the purpose of investing in aeronautical shares generally and underwriting new companies, or for the purpose of acting as a holding company for the shares of a group of existing companies.

In cases such as the Aviation Corporation of America, which was formed to take over Pan-American Airways, Atlantic Gulf and Caribbean Airways and other concerns, the group consists entirely of operating companies; but the present tendency is for the formation of what are known as " intergrated groups ", which are more or less self-contained combinations, each covering all or most of the various branches of civil aviation activity. An example of the latter is the United Aircraft and Transportation Corporation which consists of a group of companies concerned either with air transport, aircraft manufacture, aircraft selling or aeronautical finance.

During 1928, in addition to the dusting of crops with insecticide, aircraft were used with success to distribute the seeds of trees over districts which had been devasted by forest fires.

An International Civil Aeronautics Conference was held at Washington, from 12th to 14th December, 1928, delegates attending from 37 countries.

The Aeronautics Branch of the Department of Commerce issued in November, 1928 its 10,000th aeroplane number in a series covering both licensed and " identified " machines. It is interesting to note that a number of British aeroplanes and engines are now manufactured, under licence, in the United States.

CENTRAL AND SOUTH AMERICA.

The French service to South America, with its various extensions, and the American proposals for services extending through the Central and South American states, are dealt with under " France " and " United States " respectively. The following deals briefly with local aviation activities in the various states during 1928.

Argentina.—Apart from the Cie Aeropostale Argentina which is responsible for the South American sections of the French service referred to above, the only company operating in Argentina was a small concern entitled the Compania Taxi Aero which carried out a passenger, mail and freight service between Buenos Aires and Montevideo with the assistance of a subsidy provided by the Uruguayan government. There are a number of aero clubs, some of which receive government financial assistance.

Bolivia.—The Lloyd Aero Boliviano operated services over the routes Cochabamba–Santa Cruz, Cochabamba–Trinidad, Santa Cruz–Puerto Suarez, Trinidad–Riberalta and Santa Cruz–Yacuiba, the frequency varying from once in 8 days to once per month, and received from the government in respect of these operations a total subsidy equal to approximately £14,000. The government also assisted very considerably by the establishment and improvement of landing grounds.

Brazil.—The Condor Syndicate, a subsidiary of the German "Lufthansa," and the Empreza di Viacao Aerea Rio Grandense co-operated in the operation of a service between Rio de Janeiro and Rio Grande. The Companhia Brasileira de Emprehendimento co-operated over part of the French route from Natal to Buenos Aires. Other aviation concerns engaged in air survey and photography and in crop-dusting operations. Aviation interests in Brazil hope eventually to establish a seaplane service along the Amazon from Para to Iquitos (Peru).

Colombia.—The S.C.A.D.T.A. (German-Colombian Air Transport Company) continued to operate with great success its services Barranquilla–Giradot, Giradot–Nieva, Puerto Wilches–Bucaramanga and Barranquilla–Cartagena. The extension of the latter service from Cartagena to Buenaventura was also operated with great success and a further extension was subsequently made to Guayaquil (Ecuador), thus forming a connection with the Peruvian services. An extension of the Giradot–Nieva service to Iquitos (Peru) is under consideration and will be the first S.C.A.D.T.A. service to be subsidised by the Colombian government.

Guatemala.—The government has completed plans for an air mail service between Guatemala City and Flores (170 miles), and a further service between Guatemala City and Salvados is under consideration.

Honduras.—An air mail service from Tela to Tegucigalpa via Sarn Pedro Sula was operated during the year.

Mexico.—Services Tampico–Tuxpan and Vera Cruz–Merida (Yucatan) were operated by the Compania Mexicana de Aviacion S.A., which is a subsidiary of the Pan American company of the United States, and a mail service Mexico City–Laredo was

operated by the Mexican government. The latter service, which served to connect the Mexican cities with the United States air mail system has since been replaced by a service Mexico City–Brownsville which is operated by the above-mentioned company.

Peru.—The Peruvian government continued to operate with great success the combined road, rail and air passenger and mail service between Lima and Iquitos, details of which were given in the last Report. A new company entitled Peruvian Airways Corporation was formed as a subsidiary of Pan American Airways and operated a service for mails and passengers between Lima and Guayaquil, connecting at the latter city with the S.C.A.D.T.A. system, as mentioned under "Colombia." This service will eventually form a section of the Pan American company's proposed service from the United States to Valparaiso and Buenos Aires. A service between Lima and Arequipa was maintained by another company of American origin, the Fawcett Aviation Co., which also put into operation towards the end of the year a service between Lima and Talara. Several aircraft have been employed in crop-dusting operations.

Santo Domingo.—The West Indian Aerial Express Co. continued to operate between San Juan (Porto Rico), Santo Domingo and Port au Prince (Haiti). Towards the end of the year this service was taken over by Pan American Airways.

CHINA.

A British company entitled the Far East Aviation Co. was formed at Hong Kong in December, 1928, and proposes to establish mail and passenger services from Hong Kong to Macao, Canton, Swatow, Amoy, Foochow and Shanghai. The company are also interesting themselves in the sale of British aircraft in China, and are organising a seaplane flying club at Hong Kong.

Numerous other proposals for air services in China have not, so far, materialised.

JAPAN.

The Japanese government continued in 1928 to interest themselves in the question of civil aviation, and a sum of 580,000 yen (£59,000) for air transport subsidies, together with a sum of 371,800 yen (£38,000) for the general encouragement of aviation, was voted in respect of the year 1928–29. Larger sums for these purposes, and for the organisation of air routes, are to be granted in future years.

As the result of the findings of a special committee which was appointed under the supervision of the Minister of Communications and was referred to in the last Report, a company entitled "Nihon Kohku Yuso Kaisha" was formed at Tokyo with a

capital of 10,000,000 yen (£1,020,408 at par), and a contract has been placed with them for the operation of regular mail, passenger and freight services over the following routes :—

(1) Tokyo–Osaka–Fukuoka–Seoul–Dairen (2,075 km. (1,289 miles)).

(2) Osaka–Fukuoka–Shanghai (1,450 km. (901 miles)).

A subsidy of 19,970,000 yen (£2,037,755 at par) spread over a period of 11 years will be paid the company. Twelve three-engined machines have been ordered but, pending their delivery, machines have been obtained on loan from the Military authorities, and experimental flights have already commenced.

Air mail services over the routes Osaka–Fukuoka, Sakai–Oita, Tokyo–Osaka and Tokyo–Sendai were operated by various concerns during 1928. Certain of these are likely to be discontinued as a result of the opening of the services by the new company.

SIAM.

Air mail services are operated between a considerable number of the principle towns of Siam and aeroplanes are also being used for the transport of silk, pepper and other commodities. Owing to the difficulties of rapid communication by other means, all these services have proved very successful. In addition, a considerable amount of aerial photography was carried out during 1928 in connection with mapping, irrigation work and the setting out of roads and railways.

Additional aerodromes and a large number of emergency landing grounds are being laid out, and considerable extensions of the air mail system and the general use of aircraft are probable in the near future.

AIR TRANSPORT.

(STATISTICS OF REGULAR AIR SERVICES OF PRINCIPAL STATES.)

(*a*) = Actual. (*b*) = By Stages.

Country.		Route. Mileage.	Miles Flown.	*Passengers carried.	Goods carried (tons).	Mails carried (tons).	Subsidy voted.	
							National Currency.	Equivalent in £'s at average rate of exchange for the year.
Great Britain (including Middle East Service in 1927 and 1928).	1928	2,215	1,135,910	29,300	760(*a*)	125·3(*a*)	£ 250,000	
	1927	2,355	873,000	20,015(*a*)	602(*a*)	51·0(*a*)	£ 230,600	
	1926	1,368	840,000	16,775(*a*)	679(*a*)	38·6(*a*)	£ 172,500	
Belgium (including Belgian Congo)	1928	2,511	Not known	Not known	Not known	Not known	frs. 6,300,000	36,000
	1927	1,645	223,607	2,244(*a*)	42·59(*a*)	52·71(*a*)	frs. 3,850,000	22,025
	1926	1,483	143,946	1,802(*a*)	23·22(*a*)	41·56(*a*)	frs. 3,100,000	20,500
Denmark	1928	268	98,100	1,602(*a*)	34·10(*a*)	5·80(*a*)	Kr. 250,000	13,750
	1927	170	105,000	1,630(*a*)	37·60(*a*)	5·80(*a*)	Kr. 250,000	13,744
	1926	395	127,000	1,032(*a*)	26·37(*a*)	1·05(*a*)	Kr. 250,000	13,500
France	1928	12,570	4,534,156	19,698(*a*)	1138·1(*a*)	128·30(*a*)	frs. 115,000,000	927,200
	1927	8,875	3,755,380	21,555(*b*)	1190·90(*b*)	425·00(*b*)	frs. 78,650,000	634,300
	1926	7,285	3,244,000	18,861(*b*)	1080·00(*b*)	585·00(*b*)	frs. 60,500,000	396,700
Germany	1928	18,000	6,820,000	113,645(*a*)	2089·29(*a*)	340·07(*a*)	R.Mks. 20,165,000†	988,480
	1927	14,500	6,189,000	151,091(*b*)	2289·33(*b*)	813·83(*b*)	R.Mks. 22,065,000†	1,079,000
	1926	12,760	4,065,000	84,594(*b*)	1040·14(*b*)	542·15(*b*)	R.Mks. 15,571,000†	762,910

Holland	1928	1,900	760,000	14,049(*a*)	582·56(*a*)	39·1 (*a*)	fl.	600,000	49,587
	1927	1,330	589,000	19,667(*b*)	572·14(*b*)	43·75(*b*)	fl.	500,000	41,200
	1926	955	510,000	10,172(*b*)	371·04(*b*)	12·30(*b*)	fl.	300,000	24,800
Italy	1928	7,000	1,238,000	15,590(*a*)	223·67(*a*)	21·42(*a*)	lire	48,300,000	521,204
	1927	2,900	808,000	9,436(*a*)	136·60(*a*)	6·26(*a*)	lire	33,200,000	375,000
	1926	2,390	325,000	3,991(*a*)	40·26(*a*)	1·55(*a*)	lire	22,627,000	179,900
Poland	1928	1,360	660,373	6,477(*a*)	207·23(*a*)	32·17(*a*)	Zl.	6,038,000	138,805
	1927	1,796	672,635	8,385(*b*)	274·0(*b*)	13·2(*b*)	Zl.	5,464,000	125,609
	1926	1,311	532,295	7,266(*b*)	98·0(*b*)	0·7(*b*)	Zl.	4,060,000	91,553
Russia	1928	8,690	1,150,000	7,000	143·00		Not known.		—
	1927	3,690	845,000	3,700	85·00		,,	,,	—
	1926	3,220	585,000	3,591	56·00		,,	,,	—
Sweden	1928	711	171,400	4,697(*b*)	82·6(*b*)	15·4 (*b*)	Kr.	500,000	27,500
	1927	860	155,000	4,571(*b*)	84·93(*b*)	10·78(*b*)	Kr.	500,000	27,500
	1926	1,340	165,000	6,848(*b*)	144·95(*b*)	13·32(*b*)	Kr.	500,000	27,500
Switzerland ...	1928	1,143	330,600	7,146(*b*)	109·35(*b*)	43·60(*b*)	frs.	265,000‡	10,462
	1927	545	196,000	5,547(*b*)	32·45(*b*)	22·34(*b*)	frs.	170,000‡	6,700
	1926	185	210,000	2,345(*b*)	7·50(*b*)	20·00(*b*)	frs.	150,000‡	6,000
United States§ ...	1927–28	10,932	5,585,224	Not known.	Not known.	831·1	$	4,500,000	926,500
	1926–27	8,825	5,101,000	,,	,,	459·7	$	2,000,000	411,500
	1925–26	8,665	2,635,000	,,	,,	231	$	500,000	103,400

* Including in some cases a small number of non-paying passengers.
† Subsidy provided by Central Government only. Additional sums provided by local authorities.
‡ Federal Air Office subsidy only. Other subsidies granted by Post Office, cantons and towns.
§ Statistics of air mail services only, for fiscal years ending 30th June, 1926, 30th June, 1927, and 30th June, 1928. The sums given under " Subsidy Voted " are the amounts provided for payments to air mail contractors.

ADDENDA TO "MAIN TRUNK AIR LINES" MAP.

The following additions and alterations should be made :—

(1) All air services within Australia are operated by Australian companies, and should be shown as "Australian."

(2) Proposed British services should be shown between the following places :—Maracaibo–Georgetown and Georgetown–Trinidad–Barbados.

(3) The route shown from Genoa to Athens via Rome is part of the British route to India, and should be indicated as "British."

(4) A proposed U.S. route from New York to Bermuda should be substituted for the proposed route shown from Miami to Bermuda.